Pantologia

Vol. 1

PANTOLOGIA.

A Is the first letter of the alphabet in every known language, except that of Ethiopia, its Greek name is *Alpha* from the Hebrew *Aleph*, which is very significant, denoting either an *ox* or a *leader*, each a mark of excellence or priority The first place is deservedly given to this letter on account of its simplicity, and the ease with which it is pronounced, the first sound uttered by human creatures in their most infantile state, being that by which this letter is expressed

In the English language, this letter has four different sounds The broad sound, as in *all* *call* The open, as in *father*, *rather* The slender or close, which is the peculiar *a* of the English, exemplified in *place* *face*, &c And the short sound, of which we have instances in *hat*, *cat*, *fat*

A among the Romans, was used in giving votes In their Comitia there were two tables in the one were two letters U R *uti rogas* signifying the people's assent, in the other the letter A, i e *antiquo* or *antiqua probo*, to shew their dissent In capital causes they had also two tables covered with wax in one of which was this letter A, i e *absolvo*, in the other C, for *condemno*, whence the former is by Tully, *pro Milone*, called *salutaris*, the latter *tristis*

In numerals A denoted 500, and Ā 5000 In the Julian calendar, A is the first of the seven dominical letters

Among logicians, it denotes an universal affirmative proposition

A, as a word, has the following significations 1 A, an article set before nouns of the singular number, *a* man, *a* tree Before a word beginning with a vowel, it is written *an*, as, *an* ox, *an* egg 2 A is sometimes a noun, as, great *A* 3 A is placed before a participle, or participial noun *A* hunting Chloe went (*Prior*) 4 A has a signification denoting proportion The landlord hath a hundred *a* year (*Addison*) 5 A is used in burlesque poetry, to lengthen out a syllable For cloves and nutmegs to the line *a* (*Dryden*) 6 A is sometimes put for *he*, as, will *a* come, for will *he* come 7 A, in composition, seems sometimes the French à, and sometimes *at*, as *aside*, *aslope*, *aware*, *a-weary*, *a-ship* 8 A is sometimes redundant as *arise*, *arouse*, *awake*, nearly the same with *rise*, *rouse*, *wake* 9 A, in abbreviations, stands for *artium*, or arts, as A M *artium magister*, or *anno*, as A D *anno domini*

A, or before a vowel *an*, in medical and other technical terms, a preposition or prefix, which negatives or reverses the meaning of the radical term itself

In medical prescriptions, this letter with a dash above it, ā, is used for *ana*, of each

In music A is the nominal of the sixth note in the diatonic scale it is also the name of one of the two natural moods

The chemists use AAA to denote amalgam or amalgama

AA, the name of several rivers, as of three in Switzerland, one in France, one in Brabant, one in Russia, and of several of small note in Germany

AACH, a town of Nellenburgh, in Suabia it is situated on an eminence (near a river of the same name, which falls into the lake of Zell), fourteen miles N E of Schaffhausen Lat 47 55 N Long 9 E

AALBERG, or AALBOURG, capital of a bishopric of the same name in the north part of Jutland It is situate on the south shore

of Lymfort gulf This ancient city, next to Copenhagen, is the richest and most magnificent in Denmark Here is an exchange for merchants, and the harbour is deep and secure, but its entrance dangerous A considerable trade is carried on here in guns, pistols, and gloves In 1534 it was taken by Clement, the pirate, and in 1643 and 1658 by the Swedes Lat 56 50 N Lon 9 47 E

AAM, or HAAM, a liquid measure in common use among the Dutch, containing about 288 English pints

AAR, the name of two rivers, one in Switzerland, and another in Westphalia in Germany It is also the name of a small island in the Baltic

AARON, (ארון, *an ark*, or *chest* the name of the ark of the testimony, in which, among the Hebrews, the cherubim stood in the holy of holies) In Scripture history, the son of Amram and Jochebed, and grandson of Levi, was born A M 2430 He was three years older than his brother Moses, and was appointed to aid him as his advocate and interpreter, in the rescue of the Israelites from their Egyptian bondage The two brothers went together into Egypt, and accomplished their object A M 2513 During the peregrination of the Israelites in the Wilderness Aaron and his sons exercised the office of priests by a divine appointment, and, as soon as the tabernacle was built Aaron was consecrated by Moses During the continuance of Moses in the mount, whither he went to receive the law, the people became impatient and tumultuous and Aaron, yielding to their solicitations melted down their pendents, ear rings, &c and formed the golden calf to which they paid homage He afterwards humbled himself for this offence, obtained forgiveness, and was continued in the priesthood He was confirmed in this office by the miracle of the almond rod, which blossomed, and which was deposited in the most holy place, in order to perpetuate his title and the remembrance of this prodigy He married Elisheba, the daughter of Amminadab by whom he had four sons two of these were destroyed by fire, but from the other two the race of the high priests of the Jews was continued from Aaron in regular succession In consequence of his distrusting God at Meribah, he was debarred from entering Canaan About a year before the Israelites entered this country, he ascended mount Hor, disrobed himself of the pontifical ornaments, in the view of the people, and put them upon Eleazer eldest son, and his successor in the high He then died in the arms of Moses and his son, at the age of one hundred and twenty three years, and was buried in a cave of this mountain but the place of his interment was concealed, probably under an apprehension that in future ages he might become an object of superstitious worship

AARON, a physical writer of the seventh century He wrote in Syriac several treatises on medicine, entitled the Pandects, of which there are no remains He was the first author who described the small pox and measles He directed the vein under the tongue to be opened in the cure of the jaundice

AARON, the Caraite, a Jewish physician at Constantinople in 1294 He wrote a commentary on the Pentateuch, printed at Jena in folio 1710, and a Hebrew grammar, printed at Constantinople, 1581

AARSENS or AERSENS (Peter), a celebrated painter born at Amsterdam, in 1519 He painted a noble altar-piece, representing the crucifixion, at Antwerp, which was destroyed by the populace in the insurrection that happened there in 1566 He died in 1585, and left three sons, all eminent painters

AAVORA in natural history, the fruit of a sort of large palm tree, in the West Indies, and in Africa furnishing an astringent beneficial in diarrhœa

AB, in the Hebrew chronology the eleventh month of the civil year, and the fifth of the ecclesiastical year, which begins with Nisan The month Ab answers to the moon of July, and contained thirty days In the Syriac calendar, Ab is the name of the last summer month

AB, at the beginning of the names of places, generally shows that they have some relation to an abbey as *Abingdon* (*Gibson*)

ABACA a kind of flax or hemp, obtained from the Manillas, or Philippine Islands

ABACINARE a species of punishment used in the middle ages, in which criminals were blinded, by having hot metal held before their eyes

ABACK *ad* (from *back*) Backward (*Spenser*)

ABACOT the name of an ancient cap of state worn by the kings of England, the upper part whereof was in the form of a double crown

ABACTORS or ABACTORES, a name given to those who drive away or rather steal cattle by herds They are distinguished from *fures*, or thieves

ABACTUS, in midwifery, forcibly expelled (from the Latin, *abigo*, a miscarriage, produced by violence)

ABACUS, (ἄβαξ, from אבק, dust, Hebrew) A table containing medical preparations such table, whether for medicine or other sciences having formerly been projected on surfaces of sand or dust

ABACUS & *palmulæ*, in the ancient music, denote the machinery, whereby the strings of the instruments were struck, with a plectrum made of quills Sometimes also abacus signifies a kind of key board, an instrument for dividing the intervals of the octave

ABACUS, in architecture, the superior

member of the capital, to which it serves as a kind of crown. It was originally intended to represent a square tile laid over a basket; and it still retains its original form in the Tuscan, Doric, and Ionic orders: but in the Corinthian and composite, its four sides or faces are arched inwards, having some ornament, as a rose or other flower in the middle. This term is also used for a concave moulding on the capital of the Tuscan pedestal. And Palladio calls the plinth above the echinus in the Tuscan and Doric orders by the same name.

ABACUS, PYTHAGOREAN, so denominated from its inventor, Pythagoras, a table of numbers contrived for readily learning the principles of arithmetic, and was probably what we now call the multiplication table.

ABACUS LOGISTICUS is a right angled triangle, whose sides, about the right angle, contain all the numbers from 1 to 60; and its area the products of each two of the opposite numbers. This is called a *canon of sexagesimals*, and is no other than a multiplication-table carried to 60 both ways.

ABADIR, in the Roman mythology, is the name of a stone which Saturn swallowed by the contrivance of his wife Ops, believing it to be his new born infant son Jupiter: hence it ridiculously became the object of religious worship.

ABAFT. *ad.* (of abaftan, Sax.) From the fore part of the ship, toward the stern.

ABAFT THE BEAM denotes the relative situation of any object with the ship, when it is placed in that part of the horizon which is contained between a line at right angles with the keel, and that point of the compass which is directly opposite to the ship's course.

ABAGI, a silver coin in Persia, is equivalent to four sains, to thirty-six sols, old French money, or about seventeen pence English.

To ABALIENATE. *v. a.* (*abalieno*, Lat.) To make that another's which was our own before.

ABALIENATION. *s.* (*abalienatio*, Lat.) The act of giving up one's right to another.

To ABANDON. *v. a.* (*abandonner*, Fr.) 1. To give up, resign, or quit (*Dryden*). 2. To desert, to forsake (*Shakspeare*). 3. To forsake, to leave (*Spenser*).

ABANDONED. *part. a.* Corrupted in the highest degree.

ABANDONMENT. *s.* (*abandonnement*, Fr.) The act of abandoning.

ABANET (αβανηθ from אבנט, Hebrew, the girdle worn by the Jewish priests.) In old medicine, a bandage for the waist.

ABANGA. See ADY.

ABAPTISTON, or ABAPTISTA, in surgery, the saw *terebella* or perforating part of the instrument called the trepan. It is derived from the negative *α* and *βαπτω*, *I immerge*. See TREPAN.

ABARTICULATION. *s.* (from *ab*, from, and *articulus*, a joint. Lat.) That species of articulation that has manifest motion.

ABAS. 1. The tænia, or tape-worm. 2. The epilepsy, as an effect often hence produced.

ABAS, a weight used in Persia, for weighing pearls.

To ABASE. *v. a.* (*abaisser*, Fr.) To cast down, to depress, to bring low (*Sidney*).

ABASEMENT. *s.* The state of being brought low; depression (*Ecclesiasticus*).

To ABASH. *v. a.* (See BASHFUL.) To make ashamed (*Milton*).

ABASSA, a silver coin current in Persia, worth about thirty-eight sols, or eighteen pence English.

ABASSIA, the modern name of a kingdom in Ethiopia Proper: is it large, mountainous, and comprehends the provinces of Bagemeder, Gojam, Walaka, Shewa, &c.

To ABATE. *v. a.* (from the French *abbatre*.) 1. To lessen, to diminish (*Davies*). 2. To deject, or depress the mind (*Dryden*). 3. To let down the price in selling. 4. (In common law.) To *abate* a writ, is, by some exception, to defeat or overthrow it (*Cowell*).

To ABATE. *v. n.* To grow less (*Dryden*).

ABATE, in the *manege* signifies, that a horse working upon curvets, puts both his hind legs to the ground at once, and observes the same exactness at all the times.

ABATELEMENT, a term used for a prohibition of trade to French merchants in the ports of the Levant, who will not stand to their bargains, or who refused to pay their debts.

ABATEMENT. *s.* (*abatement*, Fr.) 1. The act of abating (*Locke*). 2. The state of being abated (*Arbuthnot*). 3. The sum or quantity taken away by the act of abating (*Locke*). 4. The cause of abating; extenuation (*Atterbury*).

ABATEMENT, in heraldry, an accidental figure supposed to have been added to coats of arms, in order to denote some dishonourable demeanour or stain, whereby the dignity of coat armour was rendered of less esteem.

ABATEMENT, in law, the rejecting a suit through some fault either in the matter or proceeding. Among traders the same with *rebate* or *discount*.

ABATER. *s.* The agent or cause by which an abatement is procured (*Arbuthnot*).

ABATIS, an ancient term for an officer of the stables.

ABATIS, in fortification, a range of large trees laid side by side with their boughs outwards, to hinder the approaches of an enemy.

ABATOR, in law, a term applied to a person who enters to a house or lands void by the death of the last possessor, before the true heir.

ABATOS, an island in the Lake Mœris, in Egypt, famous for being the sepulchre of Osiris, and for producing the reed papyrus, of which the ancients made their paper.

ABATTUTA, in music. An expression

generally employed after a break in the time of any piece by a *recitative*, or *cantabile ad libitum*; to apprise the performer that the measure is to be resumed, and the time beaten as before.

ABB, a term among clothiers, applied to the yarn of a weaver's warp. They say also *abb wool* in the same sense.

ABBA, in the Syriac and Chaldee languages, literally signifies *a father*, and figuratively a superior reputed as a father in respect of age, dignity or affection. It is more particularly used in the Syriac, Coptic, and [illegible] churches, as a title given to the [illegible]ps. The bishops themselves bestow the title *abba* more eminently on the bishops of Alexandria, which occasioned the people to give him the title of *Baba* or *Papa*, that is, *father of father*, a title which he bore before the bishop of Rome.

ABBACY. *s.* (*abbatia*, Lat.) The rights, possessions, or privileges of an abbot (*Ayliffe*).

ABBADIE (James), an eminent divine, born at Nay, in Berne, in 1658. He took the degree of D. D. at Sedan, and was afterwards made minister of the French church at Berlin, by the elector of Brandenburg. On the death of the elector, in 1688, Dr. Abbadie accompanied marechal Schomberg to England with the prince of Orange. He was with that great man when he fell at the battle of the Boyne in 1690, and on his return to London, was appointed minister of the French church in the Savoy, and not long after promoted to the deanry of Killaloe, in Ireland. He died in London, September 23, 1727. Abbadie was a very elegant writer, particularly upon theological subjects. His chief work is a "Treatise of the Truth of the Christian Religion," 1684. But several of his other performances have great merit. They exhibit strong tokens of great learning, and a fine imagination, and were much admired at the time of their publication.

ABBE, in a monastic sense, the same with ABBOT; in a modern sense, the name of a description of persons prevalent in France before the Revolution. They were persons who had not yet obtained any precise or fixed settlement in church or state, but were ready to accept any such as may become vacant. Their dress was rather that of an academic, or of a professed scholar than of an ecclesiastic. They were, in colleges, the instructors of youth, in private families, the tutors of gentlemen, and many procured a livelihood by their literary and witty [illegible] of different kinds.

[illegible] the superior of an abbey, or [illegible] nuns. The abbess has the same rights and authority over the nuns, that the abbots regular have over their monks. Her sex, indeed, does not allow her to perform the spiritual functions annexed to the priesthood. F. Martene, in his treatise on the Rights of the Church, observes, that some abbesses have formerly confessed their nuns. But he adds, that their excessive curiosity carried them to such lengths, that there arose a necessity of checking it.

ABBEVILLE, a town of France, in the department of the Somme, formerly the capital of Ponthieu in Picardy. It was fortified in 980, by Hugh Capet. It was the birth place of Nicolas Sanson, Pierre du Val, and Philip Briet, three celebrated navigators. Lat. 50. 7 N. Lon. 1. 55 E.

ABBEY, a monastery, or religious house governed by a superiour under the title of abbot or abbess. Abbeys differ from priories, in that the former are under the direction of abbots, the latter under that of priors: but an abbot and a prior differ in little more than the name. Monasteries were at first nothing more than religious houses, whither persons retired to spend their time in devotion. But they soon degenerated, and procured large privileges, exemptions, and riches. They prevailed greatly in Britain before the Reformation, and as they increased in riches the state became poor: for the lands possessed by them could not revert to the lords who gave them. These places were wholly abolished in England at the time of the Reformation, Henry VIII. having first appointed visitors to inspect into the lives of the monks and nuns, which were found in some places very disorderly: upon which, the abbots, perceiving their dissolution unavoidable, were induced to resign their houses to the king, who by that means became invested with the abbey-lands: these were afterwards granted to different persons, whose descendants enjoy them at this day: they were then valued at 2,853,000l. per annum—an immense sum in those days! Every abbey had at least one person whose office it was to instruct youth, and the historians of this country are chiefly beholden to the monks for the knowledge they have of former national events. In these houses the arts of painting, architecture, and printing, were cultivated. The religious houses were hospitals for the sick and poor, affording likewise entertainment to travellers at a time when there were no inns.

ABBEY-LUBBER. *s.* A slothful loiterer in a religious house, under pretence of retirement and austerity (*Dryden*).

ABBOT, or ABBAT, the superior of a monastery of monks erected into an abbey or prelacy. The name abbot is originally Hebrew, where it signifies father. The Jews call *father* in their language, *ab*, whence the Chaldeans and Syrians formed *abba*, thence the Greeks Ἀββᾶς, which the Latins retained *abbas*, and hence our *abbot*, the French *abbé*, &c. The name abbot appears as old as the institution of monks itself. In early days, they were subject to the bishops and the ordinary pastors, but at length there arose new distinctions be-

tween them. *Mitred* abbots were privileged to wear the mitre, and exempted from the jurisdiction of the bishop.—Others were called *croziered* abbots, from their bearing the crosier or pastoral staff. Others were styled *œcumenical* or universal abbots, in imitation of the patriarch of Constantinople: while others were termed *cardinal* abbots, from their superiority over all other abbots.—Among us, the mitred abbots were lords of parliament, and called abbots-sovereign, and abbots-general, to distinguish them from the other abbots. At present, in the Roman-catholic countries, the principal distinctions observed between abbots are those of *regular* and *commendatory*. The former take the vow and wear the habit of their order; whereas the latter are seculars, though they are obliged by their bulls to take orders when of proper age.

Abbot is also a title given to others beside the superiors of monasteries: thus bishops whose sees were formerly abbeys are called abbots; as are the superiors of some congregations of regular canons, particularly that of St Genevieve at Paris: and among the Genoese, the chief magistrate of their republic formerly bore the title of Abbot of the people.

Abbot (George), archbishop of Canterbury, was born October 29, 1562, at Guildford, in Surry, where his father was a weaver. He was educated at the grammar school of Guildford, from whence he was removed to Baliol college, Oxford, of which, in 1593, he became a fellow. He took his degree of D. D. in 1597, and the same year was chosen master of University college. In 1599, he was made dean of Winchester, and the year following vice chancellor of Oxford, which office he again filled in 1603, and also in 1605. In 1609, he was appointed to the see of Litchfield and Coventry, from whence, in the same year, he was translated to London, and, in 1610, he succeeded Dr Bancroft in the archiepiscopal see of Canterbury. He had the courage to oppose the court on some important occasions, particularly in the affair of the divorce of the lady Essex, and the famous book of sports, which he forbade being read at Croydon. A sad misfortune happened to him at the close of his life: for being invited to spend the summer at the seat of lord Zouch, he was one day persuaded to exercise himself in the park with a cross bow, and by accident shot the keeper instead of the deer. A commission was appointed to examine whether this irregularity incapacitated him from discharging the office of primate; and the determination being left with the king, he gave it in favour of the archbishop. He ever after kept a monthly fast on account of the misfortune, and settled twenty pounds a year on the widow of the keeper. He attended king James on his death bed, and assisted at the coronation of Charles I.; but he soon lost the favour of this monarch, which was owing to the duke of Buckingham. He was at length, however, restored, but died soon after at Croydon, aged seventy one years. He was one of the eight learned divines of Oxford, to whom the care of translating the New Testament was committed. He wrote some learned theological pieces, and a "Brief Description of the whole World." He was distinguished by his natural talents, and by a considerable portion of acquired literature: he has [illegible] looked upon as a man of great moderation toward all parties.

ABBOTSBURY, a market town on the sea coast of Dorsetshire. Lat. 50 38 N. Long. 2 42 W.

To ABBREVIATE. *v. a.* (*abbreviare*, Lat.) 1. To shorten by contraction of parts, without loss of the main substance; to abridge (*Bac.*). 2. To shorten, to cut short (*Brown*).

ABBREVIATION. *s.* 1. The act of abbreviating. 2. The means used to abbreviate, as characters signifying whole words (*Swift*).

Abbreviation of Fractions, in arithmetic and algebra, the reducing them to lower terms: that is, the proportional lessening of both the numerator and denominator. This may be performed either by continual division of the respective terms, or by dividing at once by the greatest common-measure. Thus $\frac{48}{72} = \frac{16}{24} = \frac{4}{6} = \frac{2}{3}$, by dividing both terms continually by 3, 4, and 2. Or, since 24 is the greatest common measure we have, at once $\frac{48}{72} = \frac{2}{3}$, by dividing by 24. Again, $\frac{12abx^2}{4acx} = \frac{3abx}{acx} = \frac{3bx}{cx} = \frac{3b}{c}$, by dividing the terms successively by 4, a, and x; which might be obtained at once by using $4ax$ for a divisor. And $\frac{ab^2 + b^2x}{ax + x^2} = \frac{b^2}{x}$, $a + x$ being the common measure.

ABBREVIATOR. *s.* One who abridges.

Abbreviator is more particularly used for an officer in the court of Rome appointed as assistant to the vice chancellor, for drawing up the pope's briefs, and reducing petitions, when granted by the pontiff, into proper form, for being converted into bulls. The abbreviators are supposed by Ciampini to be the successors either of the *cancellarii* in the imperial houshold, or of the seven *notarii*, said to have been placed by pope Clement I. in the seven quarters of Rome, to write down the acts of the martyrs within their several districts. They are said to have taken their name, either from their writing the *brevia*, *briefs*, or shorter epistles of the popes; or from their making use of *notæ*, or abbreviations in writing. The latter opinion may seem the more probable, in that the name is sometimes used by writers of the sixth age, and synonymous with *notarii* or *breviatores*.

ABBREVIATURE. *s.* (*abbreviatura*, Lat.) 1. A mark used for the sake of shortening. 2. A compendium or abridgment (*Taylor*).

ABBREUVOIR. *s.* (In French, a water-

ing place.) Among masons the joint or juncture of two stones.

A, B, C, pronounced *abcee*. 1 The alphabet. 2 The little books by which the elements of reading are taught (*Shakspeare*).

ABCASSIA, or ABASSIA, a subdivision of Georgia, in Asiatic Turkey, being the most northern part of that province. The inhabitants live in mean low huts, and go almost naked. Each person has an idea, that his neighbour is his enemy, and if, by any stratagem, he can catch him, sells him for a slave to the first Turk, Persian, or Tartan that appears in the country. Lat 45 to 45 N. Lon 39 to 43 E.

ABCEDARY, ABCEDARIAN or ABECEDARIAN, is sometimes applied to compositions whose parts are disposed in the orders of the letters of the alphabet. In this sense abcedarian is synonymous with alphabetical.

ABCEDE, or ABSCEDE, (from *abscedo*, to keep asunder,) a term in surgery, signifying nearly the same thing as to suppurate. See ABSCESS, PUS, and SUPPURATION.

ABDALLIES, a tribe of the Afgans who are also called Durannies. The authority of their king extends over Gisni, Candahar, Cabul, Pashawer, with a part of Multan, and Sind on the side of Persia, a great part of Carasan and Shestaun, and all Bamian on the side of Tartary.

ABDEST, a Persian word, properly signifying the water placed in a basin for washing the hands, but used to imply the legal purifications practised by the Mahometans before they enter on their religious ceremonies.

To ABDICATE. *v. a.* (*abdico*, Lat.) To give up, to resign: applied commonly to some right to office (*Addison*).

ABDICATION, ABDICATIO, derived from *abdicare, to renounce*, the act whereby a magistrate, or person in office, renounces and gives up the same before the legal term of service is expired. Abdication is frequently confounded with resignation, but strictly speaking, there is a difference; abdication being done purely and simply, whereas resignation is done in favour of some third person.

ABDICATION, among Roman writers, is more particularly used for the act whereby a father discarded or disclaimed his son, and expelled him the family. In this sense, the word stands opposed to adoption.

ABDICATIVE. *a.* That causes or implies abdication.

ABDOMEN, (from *ab*, a nourisher or contents, and *domen*, the fæces.) The word, however, is of doubtful origin, and hence others derive it from the Latin *abdo*, to hide, because it includes and hides the lower viscera, while a third class trace it from *abdere*, to hide, and *omentum*, the caul. The abdomen or belly, is the largest cavity in the body, bounded superiorly by the diaphragm, by which it is separated from the chest, inferiorly by the bones of the pubis *ischium*, on each side by various muscles, the short ribs, and *ossa ilii*, anteriorly by the abdominal muscles, and posteriorly by the vertebræ of the loins, the *os sacrum* and *os coccygis*. Internally it is invested by a smooth membrane called peritonæum, and externally by muscles and common integuments. In the cavity of the abdomen are contained: 1. Anteriorly and laterally the mesentery, the epiploon, omentum, or caul, the stomach, the large and small intestines, the lacteals, the pancreas, the spleen, the liver and gall bladder. 2. Posteriorly and without the peritonæum the kidneys, the upper renal glands, the ureters, the receptaculum chyli, or chyle reservoirs, the descending aorta, the ascending vena cava. 3. Inferiorly in the pelvis and without the peritonæum, in men, the urinary bladder, the spermatic vessels, the intestinum rectum. In women, beside the urinary bladder and intestinum rectum there are the uterus, the four ligaments of the uterus, the two ovaria, the two Fallopian tubes, the vagina. The fore part of this cavity, as has been mentioned, is covered with muscles and common integuments, in the middle of which is the navel. It is this part of the body which is properly called *abdomen*; it is distinguished by anatomists into regions. See EPIGASTRIC, HYPOCHONDRIAC, UMBILICAL and HYPOGASTRIC REGIONS. The posterior part of the abdomen is called the loins, and the sides the epic iliac regions.

ABDOMINALES FISHES. In the Linnéan system, class iv, order 4: their character being gills bony, ventral fins placed on the belly behind the thorax. See ZOOLOGY.

ABDO'MINAL HERNIA (*Hernia abdominalis*.) A tumour situated on the external part of the abdomen, arising from the protrusion of part of its viscera, not through any natural opening, but through the interstices of muscles by the parting of muscular fibres from weakness, or from an accidental wound of the abdomen.

ABDOMINAL MUSCLES. See MUSCLES.

ABDOMINAL RING (*Annulus abdominis*.) Inguinal ring. An oblong, tendinous opening in both groins through which the spermatic cord of men, and round ligaments of the uterus of women pass. It is through this opening that the intestine or omentum falls in ruptures, forming that species of hernia called *bubonocele*.

To ABDUCE. *v. a.* (*abduco*, Lat.) To draw to a different part, to withdraw one part from another (*Brown*).

ABDUCENT NERVES (*nervi abducentes*.) The sixth pair of nerves are so called because they go to the rectus externus oculi, which muscle was formerly termed the abducent. They arise from the *medulla oblongata*, between the *corpora pyramidalia* and *pons varolii*. They then advance, perforate the dura

mater, and go out of the cranium through the superior orbital fissure, and are distributed in the *rectus externus* muscle of the bulb of the eye

ABDUCTION, in logic, a kind of argumentation, by the Greeks called *apagoge*, wherein the greater extreme is evidently contained in the medium but the medium not so evidently in the less extreme as not to require some further medium or proof to make it appear

ABDUCTOR (*abductor*, *oris*, m from *ab* and *duco*, to draw) A name given to those muscles which pull back parts of the body into which they are inserted, as *abductor auricularis auris*, muscles of the external ear, *abductor indicis*, of the fore finger, *abductor longus pollicis*, of the thumb *abductor digiti minimi manus* of the little finger, *abductor minimi pedis*, of the little toe It is an inconvenience to which the art of surgery is yet subject, that these and other muscles are denominated differently by different writers and professors Thus the *abductor digiti minimi manus* is, by Winslow, called *hypothenar minor*, and, by Douglas, *extensor tertii internodii minimi digiti*

ABECEDA'RIAN s (from the names of *a*, *b*, *c*) A teacher of the alphabet, or first rudiments of literature

A'BECEDARY a Belonging to the alphabet

ABED' ad (from *a*, for *at*, and bed) In bed

ABIGA, (from *abigo*, to expel, because it was thought to promote delivery) The ground-pine or chamaepitys

ABEL (Charles Frederic), an eminent musical composer and performer, was a native of Germany and a disciple of Sebastian Bach He came to England in 1759 where he soon attracted notice both as a public performer and as a private teacher He was irascible in his temper and apt to be overbearing He put an end to a complaint of spitting of blood (under which he laboured) and to his life by excess of drinking! He died in London June 20, 1787 "His concertos and other pieces, says Dr Burney, "were very popular, and frequently played on public occasion The taste and science of Abel were rather greater than his invention, so that some of his later productions, compared with those of younger composers, appeared languid and monotonous

ABELARD (Peter), a celebrated doctor of the twelfth century, was born at Palais in Brittany, in 1079 He was well learned in divinity, philosophy, and the languages, but was particularly distinguished by his skill in logic At the age of forty, Abelard sacrificed the reputation which he had acquired to the love of pleasure, and disgraced himself by forming and executing a deliberate plan for the seduction of female innocence He read lectures in divinity with great applause in Paris, where he boarded with a canon whose name was Fulbert, and who had a very beautiful niece, named Heloise The canon, anxious to see this young lady make a figure among the learned, chose Abelard for her preceptor but instead of instructing her in the sciences, he raised in her breast that pious passion, which some dignify with the name of love, in consequence of which she became pregnant, and, at Abelard's request leaving her uncle, she went to his sisters in Brittany, where she was delivered of a son To soften the canon's resentment, he afterwards married her, though her romantic notions made her long hesitate her relations, however, enraged at his conduct, hired ruffians, who broke into his chamber by night, and inflicted on his person, a disgraceful and cruel mutilation On this he harshly and selfishly compelled Heloise to devote herself to religion in the abbey of Argenteuil Abelard sought the gloom of a cloister, in order to conceal his confusion and shame, and assumed the monastic habit in the abbey of St Dennis, but the disorders of that house soon drove him thence He was afterwards chosen superior of the abbey of Ruis, in the diocese of Vanne but here his endeavours at reformation brought his life into danger After a life of extraordinary vicissitudes Abelard died in the priory of St Marcellus, near Chalon April 21, 1142 The corpse being sent to Heloise was deposited in the Paraclete The names of this couple are eternized by the epistles published by Pope and other poets Heloise died in 1163, and was buried in the Paraclete, and in 1780 the abbess madame de Rouci ordered their bones to be placed in a leaden coffin and then deposited under the altar She also caused a monument of black marble, with a Latin inscription, to be placed over the spot

ABELI See POPULUS

ABELIANS A sect of heretics, who regulated marriage after the example of Abel, who they pretended was married but died without ever having known his wife

ABELL (John), an English musician, celebrated as a singer, and as a player on the lute He belonged to the chapel of Charles II, and so continued till the revolution, when he was dismissed on account of his being a papist He then visited the continent, and gained considerable sums as a public singer, but sometimes his extravagance brought him so low, that he was obliged to travel on foot with his lute at his back Being once at Warsaw, the king of Poland sent for him to court, but Abell refused going; on which peremptory orders were given to compel his attendance On his arrival he was seated in a chair in a spacious hall, and then drawn up to a great height when the king and his train appeared in a gallery opposite to him Several wild bears were then hurried into the hall below, and the king told him to take his choice,

either to sing or to be let down among the bears. Abell preferred the first, and used to say afterwards that he never sung so well in his life After leading this course many years he came back to England, and in 1701, published a collection of songs in several languages when he died is unknown He is said to have had the art of preserving the natural tone of his voice to extreme old age

ABELMOLUI Among Arabian physicians the ricinus, or palmus christi, whence the expressed juice, called castor oil, is obtained.

ABELMOSCH The tritiscus, or marshmallow, so named from its odour

ABENEL GAULEY A fixed star of the second magnitude in the constellation Libra

ABER-AVON A seaport and borough town of Glamorganshire, situated on Swansea bay Lat 51 38 N Lon 3 50 W

ABERBROTHICK, a royal burgh in the shire of Forfar, in Scotland. It is one district, which with Montrose, Aberdeen, Brechin, and Inverbervy, sends a member to parliament in its turn It is a market town, and the seat of a presbytery, it has eleven parishes Here was formerly the largest and richest monastery in Scotland It is about forty miles N N E of Edinburgh, and contains about 3,500 inhabitants

ABERDEEN, the name of two cities in Scotland, called the Old and New Town, situated on the German Ocean, in W Long 1 4 and N Lat 57 6 The Old Town lies about a mile to the north of the New, at the mouth of the river Don, over which is a fine Gothic bridge of a single arch, greatly admired, which rests at both ends on two rocks The New is the capital of the shire of Aberdeen For largeness trade, and beauty, it greatly exceeds any town in the north of Scotland It is built on a hill or rising ground, and lies on a small bay formed by the Dee, deep enough for a ship of 200 tons, and above two miles in circumference Aberdeen, including the Old Town, contains 17597 people Its trade is considerable, but might be greatly extended by an attention to the white fisheries King's College, and the Marischal College, in the New Town, form one university, called the University of King Charles

ABERDEENSHIRE, a county in the middle division of Scotland, which sends two members to parliament It contains the districts of Birse, Glentanner, Glenmuick, Strathdee, Strathdon, the braes or hills of Mar and Cromar, the greatest part of Buchan, Formartin, Garrioch, and Strathbogy Its inhabitants amount to 123082

ABERDEVINE, in ornithology See Siskin.

ABEREMURDER, plain or downright murder, as distinguished from the less heinous crimes of manslaughter, and chance-medley. It is derived from the Saxon *abere*, apparent, notorious, and *morth*, murder, and was declared a capital offence without fine or commutation, by the laws of Canute, and of Henry I

ABERFORD, a market town in the West-Riding of Yorkshire, celebrated for its pin manufactory Lat 53 40 N Lon 1 18 W

ABERGAVENNY, a handsome town of Monmouthshire, in Wales It is one hundred and forty-two miles from London, and is governed by a bailiff, recorder, and twenty-seven burgesses Lat 51 48 N Long 3 5 W

ABERNETHY (John), an eminent divine, was born at Coleraine in Ireland, Oct 19, 1680 In conformity to the advice of his friends, he declined the profession of physic, to which his views were at first directed, and devoted himself to the study of divinity under professor Campbell, at Edinburgh though he had previously taken the degree of A M at Glasgow In 1708, he was ordained pastor of a congregation at Antrim Not long after this, a society of dissenting ministers was established at Belfast, the object of which was to shake off subscription to the Westminster confession, in which Abernethy concurred with great zeal In 1726, the general synod passed a resolution that the non subscribing ministers should not be of their body, in consequence of which many congregations became dissatisfied with their pastors That of Abernethy dwindled away so much, that he accepted an invitation from the congregation of Wood-street, Dublin, where he continued till his death, in December, 1740 Two volumes of his sermons were printed at London, in 1748, and are deservedly held in great estimation particularly the first upon the divine attributes He published several other works, and left behind him a diary of his life which bears ample testimony to the singular excellence of his disposition and character

ABERRANCE, ABERRANCY s A deviation from the right way, an errour, a mistake (*Glanville Brown*)

ABERRANT, *a* (from *aberrans*, Lat) Wandering from the right or known way

ABERRATION s (from *aberratio*, Lat) The act of deviating from the common or right track (*Glanville*)

ABERRATION, in astronomy, a small apparent motion of the celestial bodies, occasioned by the progressive motion of light, and the earth's annual motion in her orbit The word is compounded of *ab* from, and *erro* to wander, because the stars appear to wander from their true situations. This apparent motion is so minute, that it could never have been discovered by observations, unless they had been made with extreme care and accuracy, and although it naturally arises from the combination of the two causes just mentioned, yet as it was never even suggested by theorists, until it was discovered by observation, it furnishes us with one of the strongest proofs of

the truth of the Copernican system The discovery is owing to the accuracy and ingenuity of the late Dr. Bradley, astronomer royal, he was led to it accidentally by the result of some careful observations, which he had made with a view of determining the *annual parallax* of the fixed stars The history of this discovery is related by the doctor himself, in No 406 of the Phil Trans Various explanations of the nature of aberration have been given by different authors; but we know not where to find, or how to devise, one which will be more satisfactory and familiar than that given by Dr Hutton in his Mathemat and Philosoph Dictionary, which is as follows "This effect may be explained and familiarized by the motion of a line parallel to itself, much after the manner that the composition and resolution of forces are explained If light have a progressive motion, let the proportion of its velocity to that of the earth in her orbit, be as the line B C to the line A C (Pl 5 fig 1 ASTRONOMY) then by the composition of these two motions, the particle of light will seem to describe the line B A or D C, instead of its real course B C, and will appear in the direction A B or C D, instead of its true direction C B So that if A B represent a tube, carried with a parallel motion by an observer along the line A C in the time that a particle of light would move over the space B C, the different places of the tube being A B, *a l*, *c d*, C D, and when the eye, or end of the tube, is at A let a particle of light enter the other end at B, then when the tube is at *a b*, the particle of light will be at *e*, exactly in the axis of the tube; and when the tube is at *c d*, the particle of light will arrive at *f*, still in the axis of the tube and lastly, when the tube arrives at CD, the particle of light will arrive at the eye or point C, and consequently will appear to come in the direction DC of the tube, instead of the true direction BC And so on one particle succeeding another, and forming a continued stream or ray of light in the apparent direction D C So that the apparent angle made by the ray of light with the line AF, is the angle D C E, instead of the true angle B C L, and the difference, B C D or A B C, is the quantity of the aberration If light moved only one thousand times faster than the eye, and an object, supposed to be at an infinite distance, were really placed perpendicularly over the plane in which the eye is moving, it follows, from what has been said, that the apparent place of such object will always be inclined to that plane, in an angle of 89° 56½, so that it will constantly appear 3½ from its true place, and will seem so much less inclined to the plane, that way towards which the eye tends That is, if BC be to A C as 1000 to 1, the angle B A C will be 89° 56¼, and the angle A B C 3¼ and 2 A B C will be 7', if the direction of the motion of the eye be contrary at one time, to what it is at another If the earth revolve about the sun annually, and the velocity of light were to the velocity of the earth's motion in its orbit, as 1000 is to 1, then it is easy to conceive, that a star really placed in the pole of the ecliptic, would to an eye carried along with the earth, seem to change its place continually, and neglecting the small difference on account of the earth's diurnal revolution on its axis, it would seem to describe a circle about that pole, every where distant from it by 3½ So that its longitude would be varied through all the points of the ecliptic every year, but its latitude would always remain the same Its right ascension would also change, and its declination, according to the different situation of the sun in respect of the equinoctial points, and its apparent distance from the north pole of the equator, would be 7 less at the autumnal, than at the vernal equinox The greatest alteration of the place of a star, in the pole of the ecliptic, or, which in effect amounts to the same, the proportion between the velocity of light and the earth's motion in its orbit, being known, it will not be difficult to find what would be the difference, on this account, between the true and apparent place of any other star at any time, and, on the contrary, the difference between the true and apparent place being given, the proportion between the velocity of light, and the earth's motion in her orbit, may be found After the history of this curious discovery related by Dr Bradley, in the places above referred to, he gives the results of a multitude of accurate observations made on a great number of stars at all seasons of the year and at the same time he lays down a theory which corresponds in a surprizing degree with the observations He likewise annexed to the theory rules or formulæ for computing the aberrations of the fixed stars in declination and right ascension, which have been variously demonstrated, and reduced to other practical forms, by M Clairaut in the Memoirs of the Academy of Sciences for 1737, by Mr Simpson in his Essays in 1740, by M Fontaine des Crutes in 1744 and several other persons The results of these rules are as follow Every star appears to describe in the course of a year, by means of the aberration, a small ellipse, whose greater axis is 40", and the less axis perpendicular to the ecliptic, is equal to 40' multiplied by the sine of the star's latitude, the radius being 1. The eastern extremity of the longer axis, marks the apparent place of the star, the day of the opposition, and the extremity of the less axis which is farthest from the ecliptic, marks its situation three months after The greatest aberration in longitude is equal to 20" divided by the cosine of its latitude. And the aberration for any time, is equal to 20" multiplied by the cosine of the elongation of the star found for the same time, and divided by the cosine of its latitude This aberration is sub-

tractive in the first and last quadrant of the argument, or of the difference between the longitudes of the sun and star, and additive in the second and third quadrants. The greatest aberration in latitude, is equal to 20″ multiplied by the sine of the star's latitude. And the aberration in latitude for any time, is equal to 20″ multiplied by the sine of the star's latitude, and multiplied also by the sine of the elongation. The aberration is subtractive before the opposition, and additive after it. The greatest aberration in declination, is equal to 20″ multiplied by the sine of the angle of position A, and divided by the sine of B the difference of longitude between the sun and star when the aberration in declination is nothing. And the aberration in declination at any other time, will be equal to the greatest aberration multiplied by the sine of the difference between the sun's place at the given time and his place when the aberration is nothing. Also the sine of the latitude of the star is to radius, as the tangent of A the angle of position at the star, is to the tangent of B the difference of longitude between the sun and star when the aberration in declination is nothing. The greatest aberration in right ascension, is equal to 20″ multiplied by the cosine of A the angle of position and divided by the sine of C the difference in longitude between the sun and star when the aberration in right ascension is nothing. And the aberration in right ascension at any other time, is equal to the greatest aberration multiplied by the sine of the difference between the sun's place at the given time, and his place when the aberration is nothing. Also the sine of the latitude of the star is to radius, as the cotangent of A the angle of position to the tangent of C. From the greatest variation in the place of the star the doctor deduces the ratio of the velocity of light to that of the earth in her orbit supposing both to be uniform, thus: in the figure last referred to, BC is to AC, as the velocity of light to that of the earth in her orbit, and the angle ABC is 20″, so that the ratio of those velocities is that of radius to the tangent of 20″ or (since the tangent has no sensible difference from so small an arc) as radius to 20″ but the radius of a circle is equal to an arc of 57$\frac{3}{10}$° nearly, or equal to 206260″, therefore the velocity of light is to that of the earth as 206260 to 20, or as 10313 to 1. Hence the time in which light will pass from the sun to the earth was easily deduced for this time is to one year, as AC or 20″ to 360° or the whole circle, that is 360° : 20″ :: 365d : 8m 7s therefore it appears, from this discovery of Dr Bradley's, that light passes from the sun to the earth in eight minutes seven seconds: thus confirming, in a very satisfactory manner, the conclusion of M. Roemer, deduced from observations of a totally different kind. See LIGHT.

ABERRATION OF THE PLANETS. A planet, considered as affected by aberration, appears in the place where it should have appeared at that instant which precedes the time of observation, by the interval of time occupied by light in passing from the planet to the earth. In the sun, the aberration in longitude is constantly 20″, that being the space moved by the sun, or rather by the earth, in the space of 8m 7s which is the time employed by light in passing from the sun to the earth. And, knowing pretty nearly the distance of a planet from the earth at any time we shall have, as the distance of the sun, to that of the planet, so are 8m 7s to the time of light passing from the sun to the earth: then computing the planet's geocentric motion in this time, in longitude, latitude, right ascension, or declination, it will be the planet's aberration, for whichever of these the geocentric motion was calculated, and it will be subtractive or additive, according as the planet's motion is direct or retrograde. It is evident that the aberration will be greatest in the longitude, and very small in latitude, because the planets deviate in a very small degree from the plane of the ecliptic, or path of the earth; on this account, the aberration in the latitudes of the planets is commonly neglected as nearly insensible, the greatest in Mercury being only 4$\frac{1}{2}$″, and it is considerably less than this in the other planets. As to the aberrations in declination and right ascension, they must depend on the position of the planet in the zodiac. The aberration in longitude, being determined by the geocentric motion, will be nothing at all when the planet is stationary; and greatest in the superiour planets when they are in opposition to the sun but in the inferiour planets when they are in their superiour conjunction. These *maxima* of aberration for the several planets, when their distance from the sun is least, are as follow: *georgium sidus* 25″, *saturn*, 27″, *jupiter* 29″ 8, *mars* 57″ 8, *venus* 43″ 2, *mercury* 5?″, the *moon*, $\frac{2}{3}$″. Between these quantities and nothing the aberration in longitude of the respective planets, vary according to their situations. And as to the aberration of the sun, in longitude, although it varies not (as before observed) yet it causes a variation in the aberration in declination which is greatest (about 8″) at the equinoxes where the sun's motion is most inclined to the equator, and is least (or absolutely nothing) in the solstices, where the sun's motion in the ecliptic is for a short time parallel to the equator. A quantity of aberration is occasioned by the diurnal rotation of the earth, but whether we consider it with respect to the sun, planets, or fixed stars, it is too small to be perceptible for, in the space of eight minutes, a point on the earth's surface moves through 32′ of a degree, and since small optic angles are nearly as the diameters they subtend, it is, as radius : sine 32′ :: 8″ 75 (sun's parallax) : 4″ 88, the *maximum* of aberration from this cause. On

the subject of this article we have already referred to Simpson's Essays, and Mem. Roy. Acad. Scien. for 1737: the matter is farther pursued by M. Clairaut, in those Memoirs for 1740. See also Robins's Tracts, vol. II. p. 276, D. Gregory's Astronomy, chap. 22, La Lande's Astronomy, vol. III. p. 173—210, and Vince's Astronomy, vol. I. p. 332, &c. In the Philos. Trans. vol. 60, Dr Price has given Remarks on the effects of aberration on the transit of Venus.

ABERRATION, in optics, that error or deviation of the rays of light when inflected by a lens or speculum, whereby they are hindered from meeting or uniting in the same point, called the *geometrical focus*; it is either lateral or longitudinal. The lateral aberration is measured by a perpendicular to the axis of the speculum, produced from the focus, to meet the reflected or refracted ray: the longitudinal aberration is the distance of the focus from the point in which the same ray intersects the axis. If the focal distance of any lenses be given, their apertures be small, and the incident rays homogeneous and parallel, the longitudinal aberrations will be as the squares, and the lateral aberration as the cubes of the linear apertures. There are two species of aberration, distinguished according to their different causes: the one arises from the figure of the speculum or lens, producing a geometrical dispersion of the rays, when these are perfectly equal in all respects; the other arises from the unequal refrangibility of the rays of light themselves, a discovery that was made by Sir Isaac Newton; and for this reason it is often called the Newtonian aberration. As to the former species of aberration, or that arising from the figure, it is well known that if rays issue from a point at a given distance, then they will be reflected into the other focus of an ellipse having the given luminous point for one focus, or directly from the other focus of an hyperbola, and will be variously dispersed by all other figures. But if the luminous point be infinitely distant, or which is the same, the incident rays be parallel, then they will be reflected by a parabola into its focus, and variously dispersed by all other figures. But those figures are very difficult to make, and therefore curved specula are commonly made spherical, the figure of which is generated by the revolution of a circular arc, which produces an aberration of all rays whether they are parallel or not; and therefore it has no accurate geometrical focus which is common to all the rays. Let BVF (Pl. 7. fig. 1. OPTICS) represent a concave spherical speculum, whose centre is C; and let AB, EF be incident rays parallel to the axis CV. Because the angle of incidence is equal to the angle of reflection in all cases, therefore if the radii CB, CF be drawn to the points of incidence, and thence BD making the angle CBD equal to the angle CBA, and FG making the angle CFG equal to the angle CFE, then BD, FG will be the reflected rays, and D, G, the points in which they meet the axis. Hence it appears that the point of coincidence with the axis is equally distant from the point of incidence and the centre; for because the angle CBD is equal to the angle CBA, which is equal to the alternate angle BCD, therefore their opposite sides CD, DB are equal; and in like manner, in any other, GF is equal to GC. And hence it is evident that when B is indefinitely near the vertex V, then D is in the middle of the radius CV; and the nearer the incident ray is to the axis CV, the nearer will the reflected ray come to the middle point D, and the contrary. So that the aberration DG of any ray EFG, is always more and more, as the incident ray is farther from the axis, or the incident point F from the vertex V; till when the distance VF is sixty degrees, then the reflected ray falls in the vertex V, making the aberration equal to the whole length DV. And this shews the reason why specula are made of a very small segment of a sphere; namely, that all their reflected rays may arrive very near the middle point or focus D, to produce an image the most distinct by the least aberration of the rays. And in like manner for rays refracted through lenses. In spherical *lenses* Mr Huygens has demonstrated that the aberration from the figure, in different lenses, is as follows: 1. In all plano-convex lenses, having their plane surface exposed to parallel rays, the longitudinal aberration of the extreme ray, or that most remote from the axis, is equal to $\frac{9}{2}$ of the thickness of the lens. 2. In all plano-convex lenses, having their convex surface exposed to parallel rays, the longitudinal aberration of the extreme ray, is equal to $\frac{7}{6}$ of the thickness of the lens. 3. In all double convex lenses of equal spheres, the aberration of the extreme ray is equal to $\frac{5}{3}$ of the thickness of the lens. 4. In a double convex lens, the radii of whose spheres are as 6 to 1, if the more convex surface be exposed to parallel rays, the aberration from the figure is less than in any other spherical lens, being no more than $\frac{15}{14}$ of its thickness. Mr Huygens has also shewn, that the same aberration is produced by concave lenses as by similar convex ones. It has been asserted, chiefly on the authority of Sir Isaac Newton, that this species of aberration arising from the figure of the glass, is very inconsiderable when compared with that arising from the unequal refrangibility of the rays of light; nay, it has been stated (Smith's Optics, book ii. cap. 6.) that the latter is to the former as 5449 to 1. Admitting the truth of this, it was thought very strange that objects should appear through refracting telescopes so distinctly as they are found to do; and indeed many persons despaired of success in the use and fabrication of lenses. But a little atten-

the consideration of the subject will probably convince us that the above proportion is overrated. In consequence of the aberration a geometrical point after refraction is represented not by another geometrical point but by a very small circle, which has been called the circle of diffusion. And as, in the performance of optical instruments, it is necessary that this extended representation of any point P be so small that it may not sensibly interfere with the representations of the points adjacent to P, and thus cause indistinct vision, a limit is set to the extent of the refracting surface (that is, to the aperture) which must be employed to produce this representation. But this evidently diminishes the quantity of light, and renders the vision obscure, though distinct. The nature of these aberrations may be finely illustrated by receiving on white paper the light of the sun refracted through a globe or cylinder of glass filled with water. If the paper be held parallel to the axis of the cylinder, and close to it, the illuminated part will be bounded by two very bright parallel lines, where it is cut by a diacaustic curve, and these lines will gradually approach each other as the paper is withdrawn from the vessel, till they coalesce into one very bright line. If the paper be held with its end touching the vessel, and its plane nearly perpendicular to the axis, the whole progress of the curve will be distinctly seen. We know that the doctrine of aberrations has been considered in a manner independent on caustic curves. But whoever considers the progress of rays in the eye-piece of optical instruments, will see that the knowledge of diacaustic curves determines directly, and almost accurately, the form and images that are formed there. It is of great importance to attend to the manner in which the light is distributed over the surface of the circle of smallest diffusion, for this is the representation of one point of the infinitely distant radiant object. Each point of a planet, for instance, is represented by this little circle, and as the circles representing the different adjacent points must interfere with each other, an indistinctness must arise similar to what is observed when we view an object through a pair of spectacles which do not fit the eye. The indistinctness must be in proportion to the number of points whose circles of diffusion interfere, that is, to the area of these circles, provided that the light is uniformly diffused [illegible] them; but if it be very rare at the circumference, the impression made by the [illegible] belonging to the adjacent points must [illegible] sensible. Accordingly, Sir Isaac Newton, [illegible] it incomparably rarer at the [illegible] than towards the centre, affirms that the indistinctness of telescopes arising from the spherical figure of the object-glass was incomparably less than that arising from the unequal refrangibility of light, as before stated. It is much to be regretted that this very eminent philosopher should have committed such an oversight; for the authority of his great name hindered others from examining the matter, trusting to his assertion that the light was so rare at the borders of this circle, contrary to the very nature of a caustic, in which the light is infinitely dense at these borders. The first person who detected this oversight of the British philosopher was the celebrated abbé Boscovich, who, in a dissertation published at Vienna, in 1767, shewed by a very beautiful analysis, that the distribution was extremely different from what Newton had supposed, and that the superior indistinctness arising from unequal refrangibility was very considerably less than he had stated it. The abbé's delicate and interesting process cannot possibly be explained in the compass of this article. Many ingenious philosophers in different parts of Europe have paid great attention to the subject of optical aberration, particularly with a view to improve the structure of refracting telescopes. A brief account of their labours will be found under the article ACHROMATIC.

ABERRING. *part.* (*aberro*, Lat.) Going astray, wandering (*Brown*).

To ABERUNCATE. *v. a.* (*averunco*, Lat.) To pull up by the roots.

ABERYSTWITH, in geography, a market town of Cardiganshire, in Wales. It carries on a trade in lead, calamine, and fish. It is two hundred and three miles from London. Lat. 52. 5. N. Long. 4. W.

ABESTA, or AVESTA, the name of one of the sacred books of the Persian Magi, which they attribute to their great founder Zoroaster, or Zerdusht. The Abesta is a commentary or exposition of two other of their religious books, called Zend and Pazend.

To ABET. *v. a.* (from betan, Sax.) To push forward another, to support him in his designs by connivance, encouragement, or help (*Spenser*).

ABETMENT. *s.* The act of abetting.

ABETTOR, in law, one who incites or encourages another to perform something criminal, or by some way assists him in the performance itself. There are abettors in felony, but not in treason, the law looking on all concerned in treason, as principals.

ABEX, or HABASH, a country in Higher Ethiopia, in Africa, bordering on the Red Sea, by which it is bounded on the East. It is about five hundred miles long, and one hundred broad, and is said to have more wild beasts than men for inhabitants: the heat is almost insupportable, and the air very unhealthy.

ABEYANCE, ABEIANCE, or ABBAYANCE, in law-books, something that only exists in expectation, or in the intendment, or remembrance of the law. Abeyance in our law, amounts to much the same with *hæreditas jacens*, among the Romans and [illegible]

ἀδέσποτος, or ἀδέσποτον, among the Greeks; i e *haereditas sperata* or *expectata*, or rather *notum dominium expectans* As civilians say land and goods do *jacere*, so common lawyers say, that things in like condition are in abeyance It is a maxim in law, that of every land, either there is a fee simple in somebody, or it is in abeyance

ABGARUS in biography, a name given to several of the kings of Edessa

To ABHOR *v a* (*abhorreo*, Lat) To hate with acrimony, to loathe (*Milton*)

ABHORRENCE, ABHORRENCY *s* (from *abhor*) 1 The act of abhorring, detestation (*South*) 2 The disposition to abhor, hatred (*Locke*)

ABHORRENT *a* (from *abhor*) 1 Struck with abhorrence (*Thomson*) 2 Contrary to, foreign, inconsistent with (*Dryden*)

ABHORRER *s* (from *abhor*) 1 A hater, a detester (*Swift*)

ABIB, signifying an ear of corn, a name given by the Jews to the first month of their ecclesiastical year, afterwards called Nisan It answered to the latter part of our March and beginning of our April

To ABIDE *v n* I abode or abid (from abidian, Sax) 1 To dwell in a place, not to remove (*Genesis*) 2 To dwell (*Shakspeare*) 3 To remain, not to cease or fail (*Psalms*) 4 To continue in the same state (*South*) 5 To endure without offence, anger, or contradiction (*Hall*)

To ABIDE *v a* 1 To wait for, expect, attend, await (*Shakspeare*) 2 To bear or support the consequences of a thing (*Milton*) 3 To bear or support, without being conquered (*Woodward*) 4. To bear without aversion (*Sidney*) 5 To bear or suffer (*Pope*)

ABIDER *s* (from *abide*) The person that abides or dwells in a place

ABIDING *s* (from *abide*) Continuance (*Raleigh*)

ABIES (*abies*, *etis*, f) The fir (See PINUS) The medicinal virtues of the wood are like those of its balsams, diuretic and sudorific The species chiefly employed for this purpose are *abies alba* the white or silver fir, *abies balsamica*, balm of Gilead fir, *abies canadensis*, Canadian or Virginian fir, *abies picea*, or *rubra*, red or pitch fir

ABJECT *a* (*abjectus*, Lat) 1 Mean; worthless; base (*Addison*) 2 Being of no hope or regard (*Milton*) 3 Mean and despicable (*Dryden*)

ABJECT, *s* A man without hope (*Psalms*)

To ABJECT *v a* (*abjicio*, Lat) To throw away

ABJECTEDNESS *s* (from *abject*) The state of an abject (*Boyle*)

ABJECTION, *s* (from *abject*) Meanness of mind, servility, baseness (*Hooker*)

ABJECTLY *ad* (from *abject*) In an abject manner; meanly; basely; servilely.

ABJECTNESS *s* (from *abject*) Servility, meanness (*Green*)

ABILITY *s* (*habilité*, Fr) 1 The power to do any thing, whether depending upon skill, or riches, or strength (*Sidney*) 2. Capacity, qualification, power (*Dan*) 3 When it has the plural number *abilities* it frequently signifies the faculties or powers of the mind (*Rogers*)

ABINGDON, a town in Berkshire, having a market on Monday and Friday. It is a handsome town lying on the banks of the Thames, it has two churches, and sends two members to Parliament Its earlier name was Shovesham Lat 51° 42′ Long. 1° 12 W

ABINTESTATE *a* (of *ab*, from, and *intestatus*, Lat) A term of law, implying him that inherits from a man, who though he had the power to make a will, yet did not make it

ABIOTOS (from *α*, neg and *βιῶ*, to live) The cicuta, or hemlock, so called from its deadly qualities.

ABJURATION *s* A forswearing, or renouncing by oath in the old law it signified a sworn banishment, or an oath taken to forsake the realm for ever In its modern, and now more usual signification, it extends to persons, and doctrines, as well as places Thus for a man to abjure the pretender by oath, is to bind himself not to own any regal authority in the person called the Pretender, nor even to pay him any obedience, &c

To ABJURE *v a* (*abjuro* Lat) 1 To cast off upon oath, to swear not to do something (*Hale*) 2 To retract, recant, or abnegate a position upon oath

To ABLACTATE *v a* (*ablacto*, Lat) To wean from the breast

ABLACTATION, the weaning of a child from the breast See WEANING

ABLACTATION, in the ancient agriculture, is a method of engrafting, wherein the cyon of one tree, being united for some time to the stock of another, is afterwards cut off, and, as it were, weaned from its mother-tree Among the modern writers, ablactation is more usually called marching, or grafting by approach

ABLAQUEATION *s* (*ablaqueatio*, Latin) The practice of opening the ground about the roots of trees (*Evelyn*)

ABLATION *s.* (*ablatio*, Latin) The act of taking away

ABLATIVE *a* (*ablativus*, Latin) 1 That takes away

ABLATIVE, in grammar, the sixth case of Latin nouns The word is formed from *auferre, to take away* Priscian also calls it the *comparative case*, as serving, among the Latins, for comparing, as well as taking away. The *ablative* is opposite to the *dative*; the first expressing the action of taking away, and the latter that of giving In English, French, &c there is no precise mark whereby to distinguish the ablative from other cases, and we

only use the term in analogy to the Latin Thus, in the two phrases, *the magnitude of the city*, and *he spoke much of the city*, we say, that *of the city* in the first is *genitive* and in the latter *ablative*, because it would be so, if the two phrases were expressed in Latin The question concerning the Greek ablative has been the subject of a famous literary war between two great grammarians, Frischlin and Crusius, the former of whom maintained, and the latter opposed, the reality of it

A'BLE *a* (*habile*, Fr *habilis*, Lat) 1 Having strong faculties, or great strength or knowledge, riches, or any other power of mind, body, or fortune (*Bacon*) 2 Having power sufficient, enabled (*Southern*)

To A'BLE *v a* To make able, to enable (*Shakspeare*)

ABLE-BODIED *a* Strong of body (*Addison*)

ABLECTI, in Roman antiquity, a select body of soldiers, chosen from among those called *extraordinarii*

To A'BLEGATE *v a* (*ablego*, Lat) To send abroad upon some employment

ABLEGATION *s* (from *ablegate*) The act of sending abroad

ABLEGMINA, in Roman antiquity, choice parts of the entrails of victims The ablegmina were sprinkled with flour, and burnt on the altar, the priests pouring some wine on them

A'BLENESS *s* (from *able*) Ability of body, vigour, force (*Sidney*)

ABLEPSIA (from α neg and βλεπω to see) Blindness Want of sight

To A'BLIGATE *v a* (*abligo*, Lat) To tie up from

ABLIGURITION *s* (*abligurition*, Lat) Prodigal expence on meat and drink

To A'BLOCATE *v a* (*abloco*, Lat) To let out to hire

To ABLUDE *v n* (*alludo*, Lat) To be unlike

A'BLUENT *a* (*abluens*, Lat) That has the power of cleansing

ABLUTION (from *abluo*, quasi *ab* & *lavo, I wash away*), in antiquity, a religious ceremony in use among the Romans, being a sort of purification, performed by washing the body, before they entered on sacrifice Sometimes they washed their hands and feet sometimes the head, and oftentimes the whole body for which purpose, at the entrance into their temples, were placed marble vessels filled with water Ablutions appear to be as old as any religious ceremonies, and to have been adopted in almost every religion

ABLU'TION *s* (*ablutio*, Lat) 1 The act of cleansing, or washing clean 2 The water used in washing (*Pope*) 3 The rinsing of chemical preparations in water 4 The cup given, without consecration, to the laity in the popish churches

To A'BNEGATE *v a* (*abnego*, Lat) To deny

ABNEGATION *s* (*abnegatio*, Lat) Denial, renunciation (*Hammond*)

ABNODATION *s* (*abnodatio*, Lat) The act of cutting away knots from trees

ABNO'RMOUS *a* (*abnormis*, Lat) Out of rule, irregular, misshapen

ABO, the metropolis of Finland Proper, Sweden It was built 1155 The episcopal see, which was founded about 1226, is under the archbishopric of Upsal In 1640 it was made an university It was almost reduced to ashes by a dreadful fire in 1678 In 1713 it was taken by the Russians, who kept it till 1720, when it was restored to Sweden by the peace of Nystadt Lat 60 27 N Lon 22 14 E

ABOARD *a* (from the French *a bord*, as *aller a bord*, *envoyer a bord*) In a ship (*Raleigh*)

ABO'DE *s* (from *abide*) 1 Habitation, dwelling (*Waller*) 2 Stay, continuance in a place (*Shakspeare*) 3 *To make* ABODE. To dwell, to reside (*Dryden*)

To ABO'DE *v a* (See BODE) To foretoken or foreshow, to be a prognostic (*Shakspeare*)

ABODEMENT *s* (from *to abode*) A secret anticipation of something future (*Shakspeare*)

To ABO'LISH *v a* (from *aboleo*, Lat) 1 To annul, to make void (*Hooker*) 2 To put an end to, to destroy (*Hayw*)

ABOLISHABLE, *a* (from *abolish*) That may be abolished

ABO'LISHER *s* (from *abolish*) He that abolishes

ABOLISHMENT } *s* (from *abolish*) The ABOLITION } act of abolishing, destroying, effacing, or putting out of memory It also signifies the leave given by the king, or judges, to a criminal accuser to desist from further prosecution

ABOLLA, a military garment, worn by the Greek and Roman soldiers it was lined or doubled, for warmth There seem to have been different kinds of abollas, fitted to different occasions Even kings appear to have used them Caligula was affronted at king Ptolemy for appearing at the shows in a purple abolla and by the eclat thereof turning the eyes of the spectators from the emperor upon himself

ABO'MASUM, (from *ab* dimin and *omasum*, the stomach) The fourth stomach of ruminating animals The maw

ABO'MINABLE *a* (*abominabilis*, Lat) 1 Hateful, detestable (*Swift*) 2 Unclean (*Leviticus*) 3 In low and ludicrous language, it is a word of loose and indeterminate censure (*Shakspeare*)

ABO'MINABLENESS *s* (from *abominable*) The quality of being abominable, hatefulness, odiousness (*Bentley*)

ABO'MINABLY *ad* (from *abominable*) Excessively; extremely, exceedingly in the ill sense (*Arbuthnot*)

To ABO'MINATE *v a* (*abominor*, Lat) To abhor, detest, hate utterly (*Southern*)

ABOMINATION *s* 1 Hatred, detestation (*Swift*) 2 The object of hatred (*Genesis*) 3 Pollution, defilement (*Shakspeare*) 4 The cause of pollution (*2 Kings*)

ABORIGINES, originally a proper name, given to a certain people in Italy, who inhabited the ancient Latium, or country now called Campagna di Roma Whence this people came by the appellation is much disputed The name is now given to the primitive inhabitants of a country, in contradistinction to colonies, or new races of people

ABORTIENT (*abortiens*) In botany, a term applied to flowers without seeds

ABO'RTION (*abortio, abo*) Premature birth Originally used as a natural miscarriage in opposition to *abacceenter*, which implies the use of *force* The term is confined to the early months of pregnancy a miscarriage after the seventh month being called a premature labour

ABORTIVE *s* That which is born before the due time (*Peacham*)

Abortive *a* (*abortivus*, Lat) 1 Brought forth before the due time of birth (*Shakspeare*) 2 That fails for want of time (*Southern*) That brings forth nothing (*Milton*)

ABORTIVELY *ad* (from *abortive*) Born without the due time, immaturely, untimely

ABORTIVENESS *s* (from *abortive*) The state of abortion

ABORTIVES, (*abortiva, sc medicamenta* from *abortor*, to be steril) Antilotics Medicines capable of occasioning an abortion or miscarriage in pregnant women It is now generally believed, that the medicines which produce a miscarriage, effect it by their violent action on the system, and not by any specific action on the womb

ABORTMENT *s* (from *aborto* Lat) The thing brought forth out of time an untimely birth (*Bacon*)

ABOVE *prep* (from *a*, and bufan Saxon, *boven*, Dutch) 1 Higher in place (*Dryden*) 2 More in quantity or number (*Exodus*) 3 Higher in rank, power, or excellence (*Psalms*) 4 Superior to, unattainable by (*Swift*) 5 Beyond, more than (*Locke*) 6 Too proud for, too high for (*Pope*)

Above *ad* 1 Overhead, in a higher place (*Bacon*) 2 In the regions of heaven (*Pope*) 3 Before (*Dryden*)

ABOVE ALL In the first place, chiefly (*Dryden*)

ABOVE-BOARD In open sight without artifice or trick (*L Estrange*)

ABOVE-CITED Cited before (*Addison*)

ABOVE-GROUND An expression used to signify, that a man is alive not in the grave

ABOVE-MENTIONED Mentioned before.

ABOUKIR, in geography, a small town of Egypt, situate in the desert between Alexandria and Rosetta This place has been rendered famous by the engagement in 1798, between the English and French Fleets, in which the former obtained a signal victory on this account the commander Nelson, was honoured with a peerage Aboukir is the ancient *Canopus*

To ABOUND *v n* (*abundo*, Lat *abonder*, French) 1 To have in great plenty (*Dryden*) 2 To be in great plenty (*Pope*)

ABOUT *prep* (abutan, or abuton, Saxon) 1 Round, surrounding, encircling (*Dryden*) 2 Near to (*Ben Jonson*) 3, Concerning, with regard to, relating to (*Locke*) 4 Engaged in, employed upon (*Taylor*)

About *ad* 1 Circularly, in a round (*Shakspeare*) 2 In circuit, in compass (*Shakspeare*) 3 Nearly (*Bacon*) 4 Here and there, every where (*Ja Q*) 5 With *to* before a verb, as *about to fly*, upon the point, within a small time of 6 Round the longest way in opposition to the short straight way (*Shakspeare*) 7 To bring *about*, to bring to the point or state desired as, *he has brought about his purposes* 8 To come *about*, to come to some certain state or point 9 To go *about* a thing, to prepare to do it

A Bp for Archbishop

ABRA, a silver Polish coin, worth about one shilling

ABRACADABRA, a magical word, recommended by Serenus Samonicus as an antidote against agues and several other diseases It was to be written upon a piece of paper as many times as the word contains letters, omitting the last letter of the former every time, and then suspended about the neck by a linen thread *Abracadabra* was the name of a god worshipped by the Syrians

ABRADATES a king of Susa, in Persia, who, when his wife Panthea had been taken prisoner by Cyrus, and humanely treated, surrendered himself and his troops to the conqueror He was killed in the first battle he undertook in the cause of Cyrus, and his wife stabbed herself on his corpse Cyrus raised a monument on their tomb See Panthea

To ABRADE *v a* (*abrado*, Lat) To rub off to wear away from the other parts, to wear away by degrees (*Hale*)

ABRAHAM, (*father of the womb*, *i e of a great multitude*) the patriarch, was at first called Abram (*high father*,) but his name was altered by divine appointment He was born 352 years after the flood, and A M 2008, according to the Hebrew chronology, at Ur of the Chaldees His father Tera went in his old age to reside at Haran, in Canaan, where Abram received the divine promise that he should be the father of a great nation, on which he, with his wife Sarah, and his nephew Lot, left Haran, and dwelt for some time at Sichem, where he built

serving to the Lord. A famine drove them from thence into Egypt, and on their return into Canaan a dispute arose between the servants of Abram and those of Lot, which induced the two kinsmen to part, Lot going towards Sodom, and Abram towards Mamre. The conduct of Abraham in this instance was generous, and noble, while that of Lot was mercenary and ungrateful. The latter acted as one whose sordid spirit had much weakened his attachment to religion; the former as one who was fitly selected for preventing the universal prevalence of idolatry, and preserving among mankind (by means of his posterity) the knowledge and worship of God. When Lot was taken prisoner by the prince of Elam, Abram armed his servants, retook his nephew and all the spoil. Having no prospect of a child by Sarah, he took Hagar an Egyptian as a concubine, by whom he had Ishmael; but at the age of ninety he received a promise that Sarah also should have a son, and in consequence his name was changed to Abraham. At the same time circumcision was instituted. Going afterwards to Gerar, Sarah was delivered of a son named Isaac. When Isaac was grown to maturity Abraham was commanded, as a trial of his faith, to offer him up as a sacrifice; but just as he was about to fulfil the divine command the angel of the Lord stopped his hand, and provided a ram for a burnt-offering. About 12 years after this, Sarah died. When Abraham was in the 141st year of his age, he married Keturah, by whom he had six sons, who were all heads of different nations. This venerable Patriarch died, in the year of the world 2183, aged 175 years, and was buried near Sarah his wife.

ABRAHAMITES, an order of monks exterminated for idolatry by Theophilus in the ninth century. Also the name of another sect of heretics who had adopted the errors of Paulus. See PAULICIANS.

ABRANTES, a town of Estremadura, in Portugal, supposed to be the Tubucci of Antoninus. Here is a Casa de Misericordia, or house of mercy, an hospital, and four convents. The number of its inhabitants is about 35,000. Lat. 39° 19 N. Lon. 7 18 W.

ABRASAX, or ABRAXAS, the supreme god of the Basilidian heretics. It is a mystical word, composed of the Greek numerals α, β, ρ, α, ξ, α, ς, which together make up the number CCCLXV. For Basilides taught, that there were 365 heavens between the earth and the empyream, each of which heavens had its angel or intelligence, which created it, each of which angels likewise was created by the angel next above it, thus ascending by a scale to the Supreme being, or first Creator. The Basilidians used the word *Abraxas* by way of charm or amulet.

ABRASION, s. (See ABRADE.) 1. The act of abrading; the rubbing off. 2. The matter worn off by the attrition of bodies.

ABRAXAS, an antique stone with the word abraxas engraven on it. They are of various sizes, and most of them as old as the third century. They are frequent in the cabinets of the curious, and a collection of them, as complete as possible, has been desired by several. There is a fine one in the abbey of St Genevieve, which has occasioned much speculation. Most of them seem to have come from Egypt, whence they are of some use in explaining the antiquities of that country. Sometimes they have no other inscription besides the word: but others have the names of saints, angels, or Jehovah himself, annexed; though most usually the name of the Basilidian God.

ABREAST. ad. (See BREAST.) Side by side; in such a position that the breasts may bear against the same line (*Shakspeare*).

To ABRIDGE. v. a. (*abreger* Fr. *abbrevio*, Lat.) 1. To make shorter in words, keeping still the same substance (2 *Macc.*). 2. To contract, to diminish, to cut short (*Locke*). 3. To deprive of, to cut off from (*Shakspeare*).

ABRIDGED OF. p. Deprived of, debarred from, cut short.

ABRIDGER. s. (from *abridge*.) 1. He that abridges, a shortener. 2. A writer of compendiums or abridgments.

ABRIDGING, in algebra, the reducing of a compound equation or quantity to a more simple form of expression. Thus in the equation $x^3 - cx^2 + cdx + cde = 0$, putting $q = cd$, and $s = cde$, we have $x^3 - cx^2 + qx + s = 0$.

ABRIDGMENT. s. (*abregement*, French.) 1. The epitome of a larger work into a small compass, a compend (*Hooker*). 2. A diminution in general (*Donne*). 3. Contraction, reduction (*Locke*). 4. Restraint from any thing pleasing (*Southern*).

ABRIDGMENT, in literature, is the first of the acceptations given to the word above. Abridgments are in many cases necessary and useful, though it requires particular talents to perform the office of an abridger well. The practice of abridging books that are read, or lectures of professors in different departments of science, so as to prune away superfluities and redundancies, and retain what is essential in point of fact, argument, or illustration, is highly beneficial as it may assist the judgment, while it eases the memory. The following specimens of the kind of abridgment we advert to, are taken from Doctor Rees's Cyclopædia. Mr Hume's design in his Essay on Miracles, is to prove that miracles which have not been the immediate objects of our senses cannot reasonably be believed upon the testimony of others. His argument is, "That experience, which in some things is variable, in others uniform, is our *only* guide in reasoning, concerning matters of fact. Variable experience gives rise to probability only, an uniform ex... amounts to proof. Our belief of any f... the testimony of eye witnesses, is derive...

no other principle than our experience of the veracity of human testimony If the fact attested be miraculous, here arises a contest of two opposite experiences, or proof against proof Now a miracle is a violation of the laws of nature; and as a firm and unalterable experience has established these laws, the proof against a miracle, from the very nature of the fact, is as complete as any argument from experience can possibly be imagined, and if so, it is an undeniable consequence that it cannot be surmounted by any proof whatever derived from human testimony Doctor Campbell, in his Dissertation on Miracles, shews the fallacy of Mr Hume argument, by another argument, thus "The evidence arising from human testimony is *not solely* derived from experience on the contrary, testimony has a natural influence on belief antecedent to experience The early and unlimited assent given to testimony by children, gradually contracts as they advance in life it is, therefore, more consonant to truth to say that our *diffidence* in testimony is the result of experience, than that our *faith* in it has this foundation Besides, the uniformity of experience in favour of any fact, is not a proof against its being reversed in a particular instance The evidence arising from the single testimony of a man of known veracity, will go farther to establish a belief in its being actually reversed If his testimony be confirmed by a few others of the same character we cannot withhold our assent to the truth of it Now, though the operations of nature are governed by uniform laws, and though we have not the testimony of our senses in favour of any *violation* of them, still, if in particular instances we have the testimony of thousands of our fellow-creatures and those, too men of strict integrity, swayed by no motives of ambition or interest, and governed by the principles of common sense, that they were actually witnesses of these violations, the constitution of our nature obliges us to believe them These two examples contain the substance of about 400 pages The Abbe Gaultier has published A Method of making Abridgments in 2 vols 4to

ABRIZAN, the name of a feast held by the old [illegible]sians on the 13th day of the month Tir, nearly corresponding to our September The feast was preparatory to the autumnal rains, and it was the practice in the course of it to pour out water

ABROACH *ad* (See *To* BROACH) 1 In a posture to run out (*Swift*) 2 In a state to be diffused or propagated (*Shakspeare*)

ABRO'AD *ad* (compound of *a* and *broad*) 1 Without confinement, widely, at large (*Milton*) 2. Out of the house (*Shakspeare*) 3 In another country (*Hooker*) 4 In all directions, this way and that (*Dryden*) 5 Without, not within (*Hooker*)

To ABROGATE *v a* (*abrogo*, Lat) To take away from a law its force, to repeal; to annul (*Hooker*)

ABROGATION *s* (*abrogatio*, Lat) The act of abrogating, the repeal of a law (*Clarendon*) *Abrogation* stands opposed to *rogation* it is distinguished from *derogation* which implies the taking away only some part of a law, from *subrogation*, which denotes the adding a clause to it, from *obrogation*, which implies the limiting or restraining it, from *dispensation* which only sets it aside in a particular instance, and from *antiquation*, which is the refusing to pass a law

ABROMA In botany, a genus of the Linnéan class polyadelphia, and order dodecandria. Its generic character is as follows: calyx five-leaved, corol five-petaled, nectary cup shaped, five cleft, filaments five, inserted between the divisions of the nectary, each bearing three anthers, styles five, subulate, capsule membranaceous, five-celled, seeds winged There are only two known species of the abroma, both of which are inhabitants of the East Indies, and the Cape of Good Hope 1 A angusta leaves seven-angled petals ovate lanceolate, pointed, lightly [illegible] [illegible] axillary 2 A Wheleri leaves ovate lanceolate, pointed more or less toothed, peduncles opposite the leaves

ABROTANUM (*abrotanum*, [illegible] from [illegible] and [illegible], mortal because it never decays, or from [illegible], of and [illegible] extension, from the delicacy of its texture) *Abrotanum mas* Common southernwood *Artemisia abrotanum* of Linnéus *Artemisia fruticosa foliis setaceis ramosissimis* Class syngenesia, order polygamia superflua A plant possessed of a strong, and to most people an agreeable, smell, a pungent bitter and somewhat nauseous taste It is supposed to stimulate the whole system, but more particularly the uterus It is very rarely used unless by way of fomentation with which intention the leaves are directed by the London college in the *decoctum pro fomento* See ARTEMISIA

ABROTANUM FEMINA *Santolina* Common lavender cotton This plant *Santolina chamæ-cyparissus, pedunculis unifloris, foliis quadrifariam dentatis* of Linnéus, possesses antihysterical, anthelmintic, and deobstruent virtues and may be employed in all cases as a substitute for the *abrotanum* of our pharmacopœias See SANTOLINA

ABROTANUM MAS See ABROTANUM

ABRUPT *a* (*abruptus*, Lat) 1 Broken, craggy (*Thomson*) 2 Divided, without any thing intervening (*Milton*) 3 Sudden, without the customary or proper preparatives (*Shakspeare*) 4 Unconnected (*Ben Jonson*)

ABRUPT LEAF In botany, a term used only in pinnate leaves, which are said to be abruptly pinnate (*abrupte pinnata*) when they have neither leaflet (*foliolum*), nor tendril or clasper (*cirrus*) at the end.

ABRUPTED *a* (*abruptus*, Lat) Broken off suddenly (*Brown*)

ABRU'PTION *s* (*abruptio*, Lat) Violent and sudden separation (*Woodward*)

ABRU'PTLY *ad* (See ABRUPT) Hastily, without the due forms of preparation (*Sidney*)

ABRU'PTNESS *s* (from *abrupt*) 1 An abrupt manner, haste, suddenness 2 Unconnectedness, roughness cragginess (*Woodward*)

ABRUS In botany, a genus of the Linnéan class *diadelphia*, and order *decandria* of which the following is its generic character calyx obsoletely four-lobed, the upper lobe broadest, filaments nine, united into a sheath at bottom, gaping at the back, stigma obtuse, seeds spherical. There is but one species, A precatorius, or Jamaica wild liquorice It is a native of both the Indies, Egypt, and Guinea The plant is shrubby, twining, leaves pinnate, with many oblong leaflets, corols in axillary racemes, pale purple, legume oblong, seeds five or six, scarlet or white, with a black eye It is these beautiful seeds which, in consequence of their resemblance to beads, are so frequently strung into necklaces and worn as an ornament by the fair of Africa, Asia, and even Europe

ABSCESS (*abscessus, us*, m from *abs*, and *cedo*, to retire) The words ἀπόστημα, apostume, and ἀπόστασις, impostumation, frequently used by Hippocrates, are translated by Celsus *abscessus*, and sometimes *vomica* Hence the word abscess is generally used by modern authors to signify a suppurated phlegmon or inflammatory tumour These terms appear originally, by their derivation, to import any sort of exclusion of morbific matter but Paulus Ægineta seems to have limited the signification of *abscess* to suppuration, by defining ἀπόστημα, *abscess*, a corruption of the fleshy parts, muscles, veins, and arteries

To ABSCI'ND *v a* To cut off

ABSCISS, ABSCISSE, or ABSCISSA, of a conic section, or a curve, is a part or segment cut off a line at some certain point, which is determined by an ordinate to the curve As AP or PB in the figures to *Abscess* (Plate 6, *Curves*) PQ being the ordinate The absciss may either commence at the vertex of the curve, or at any other fixed point And it may be taken either upon the axis or diameter of the curve, or upon any other line drawn in a given position Hence there are an infinite number of variable abscisses, terminated at the same fixed point at one end, the other end of them being at any point of the given line or diameter In the common parabola, each ordinate PQ has but one absciss AP, in the ellipse or circle, the ordinate has two abscisses AP, BP, lying on the opposite sides of it and in the hyperbola the ordinate PQ has also two abscisses, but they lie both on the same side of it In general, a line of the second kind, or a curve of the first kind, may have two abscisses to each ordinate But those of the third order may have three abscisses to each ordinate, a line of the fourth order may have four; and so on. The use of the abscisses is, in conjunction with the ordinates, to express the nature of the curves, by some proportion or equation including the absciss and its ordinate, with some other fixed invariable line or lines Every different curve has its own peculiar equation or property by which it is expressed, and different from all others and that equation or expression is the same for every ordinate and its abscisses, whatever point of the curve be taken So, in the circle, the square of any ordinate is equal to the rectangle of its two abscisses, or AP BP=PQ², in the parabola, the square of the ordinate is equal to the rectangle of the absciss and a certain given line called the parameter, in the ellipse and hyperbola, the square of the ordinate is always in a certain constant proportion to the rectangle of the two abscisses, namely, as the square of the conjugate to the square of the transverse, or as the parameter is to the transverse axis, and so for other properties in other curves When the natures or properties of curves are expressed by algebraic equations, any general absciss is commonly denoted by the letter x and the corresponding ordinate by the letter y, the other or constant lines being represented by other letters Then the equations expressing the natures of different curves will admit of various forms, according to the situation of the point at which the absciss is supposed to commence, or to the relations of the co-ordinates Thus, if the abscisses should be estimated from the vertex of the curve, or an end of the diameter, then the equations are as follow namely, for the

Circle, $2dx - x^2 = y^2$, where $2d$ is the diameter A B

Parabola, $px = y^2$, where p is the parameter

Ellipse, $\frac{t^2 y^2}{c^2} = 2tx - x^2$
Hyperbola, $\frac{t^2 y^2}{c^2} = \pm 2tx + x^2$
where $2t$ is the transverse, and $2c$ the conjugate axis

But if we take the abscisses from the centre, then, in the

Circle, $d^2 - x^2 = y^2$, where $2d$ is as before

Ellipse, $\frac{t^2 y^2}{c^2} = t^2 - x^2$
Hyperbola, $\frac{t^2 y^2}{c^2} = x^2 - t^2$
where $2t$ and $2c$ are as before

We may likewise make use of p the parameter in the equations to the ellipse and hyperbola then, in the

Ellipse, $\frac{2ty^2}{p} = 2tx - x^2$
Hyperbola, $\frac{2ty^2}{p} = x^2 \pm 2tx$
when the abscisses are taken from the vertex

Ellipse, $\frac{2ty^2}{p} = t^2 - xx$
Hyperbola, $\frac{2ty^2}{p} = x^2 - t^2$
when the abscisse are taken from the centre

In the hyperbola between the asymptotes, we denote CR by x, and RS by y, and the equation will be $xy = ab$, a known rectangle And lastly, in the parabola, we may denote

Ap, by x, as an abscissa, and pQ by y, as an ordinate, then the equation will be $x^2=py$, p being the parameter Here the abscess x may be either positive or negative, but the ordinates must always be positive In the other cases the ordinates may be either positive or negative

ABSCISSION s (*abscissio*, Lat) 1 The act of cutting off (*Wisem*) 2 The state of being cut off (*Brown*)

To ABSCOND v n (*abscondo*, Lat) To hide one s self

ABSCONDER s (from *abscond*) The person that absconds

ABSENCE s (See ABSENT) 1 The state of being absent, opposed to presence (*Shaks*) 2 Want of appearance, in the legal sense (*Add*) 3 Inattention, heedlessness, neglect of the present object (*Add*)

ABSENT a (*absens*, Lat) 1 Not present used with the participle *from* (*Pope*) 2 Absent in mind, inattentive (*Add*)

To ABSE'NT v a To withdraw, to forbear to come into presence (*Shaks*)

ABSENTEE s He that is absent from his station, or employment, or country (*Dav*)

ABSINTHIATED p (from *absinthium*, Lat) Impregnated with wormwood

ABSINTHITES (from *absinthium*) Any fluid impregnated with wormwood

ABSINTHIUM (ἀψίνθιον, from α, neg and ψίνθος, pleasant) Wormwood, so named from the disagreeableness of its taste It forms a species of the Linnéan class syngenesia, order polygamia superflua, and genus artemisia See ARTEMISIA

To ABSIST v n (*absisto*, Lat) To stand off, to leave off

To ABSOLVE v a (*absolvo*, Lat) 1 To clear, to acquit of a crime, in a judicial sense (*Shaks*) 2 To set free from an engagement or promise (*Wall*) 3 To pronounce a sin remitted, in the ecclesiastical sense (*Pope*) 4 To finish, to complete Little used

ABSOLUTE a (*absolutus*, Lat) 1 Complete (*Hooker*) 2 Unconditional as, an *absolute* promise (*South*) 3 Not relative as, *absolute* space (*Stil'ing*) 4 Not limited as, *absolute* power (*Dryd*) 5 Positive, certain (*Shaks*)

ABSOLUTE EQUATION, in astronomy, is the sum of the optic and eccentric equations The apparent inequality of a planet s motion, arising from its not being equally distant from the earth at all times, is called its optic equation, and this would subsist even if the planet s real motion were uniform The eccentric inequality is caused by the planet s motion being not uniform

ABSOLUTE MOTION, PLACE, SPACE See the respective substantives

ABSOLUTE NUMBER In algebra, that term which is completely known in an equation, and which is equal to the aggregate of the rest As in the equation, $x^2+32x-68=0$, or $x^2+32x=68$, the absolute number is 68

ABSOLUTELY ad (from *absolute*) 1 Completely, without restriction (*Sidney*) 2 Without relation (*Hook*) 3 Without limits or dependance (*Dryd*) 4 Without condition (*Hook*) 5 Peremptorily, positively (*Milt*)

ABSOLUTENESS s (from *absolute*) 1 Completeness 2 Freedom from dependance, or limits (*Clar*) 3 Despotism (*Bac*)

ABSOLUTION In civil law, is a sentence whereby the party accused is declared innocent of the crime laid to his charge.

ABSOLUTION, in the canon law, is a juridical act, whereby the priest declares the sins of such as are penitent remitted The Romanists hold absolution a part of the sacrament of penance

ABSOLUTION is chiefly used among Protestants for a sentence whereby a person who stands excommunicated is released or freed from that punishment

ABSOLUTORY a (*absolutorius*, Lat) That does absolve

ABSONANT a Contrary to reason

ABSONOUS a (*absonus*, Lat) Absurd, contrary to reason (*Glanville*)

To ABSORB v a (*absorbeo*, Lat preter *absorbed*, part pret *absorbed*, or *absorpt*) 1 To swallow up (*Phillips*) 2 To suck up (*Harvey*)

ABSORBENT EARTHS, in chemistry, a term formerly used to denote the substances called alkaline earths

ABSORBENTS, (*absorbentia*) Calcareous earths, or other medicines which soak up the redundant humours of the body Also, a system of vessels that absorb and convey fluids from every cavity of the body to the thoracic duct, which is their common trunk These last are likewise denominated *lymphatics*, and those of the smaller intestines, from the milky hue of the fluid in most animals, *lacteals*

ABSORBING, the swallowing up, sucking up, or imbibing any thing thus black bodies are said to absorb the rays of light, luxuriant branches, to absorb or waste the nutritious juices which should feed the fruit of trees, &c

ABSORPTION, in the animal œconomy, is the power whereby the absorbent vessels imbibe

ABSORPTION, in chemistry, that process by which a decrease of bulk is effected in the combination of gaseous substances with other gases, or with liquids or solids, and which unites those substances so intimately with the absorbent, as to destroy their gaseous nature It is distinguished from condensation in these respects the latter acts by pressure, and the former by combination; condensation merely diminishes the bulk of the gas, while absorption changes it character, and, by uniting it

with other substances, reduces it to the state of a liquid or a solid

To ABSTAIN *v. n.* (*abstineo*, Lat.) To forbear, to deny one's self any gratification.

ABSTEMII, in church history, a name given to such persons as could not partake of the cup of the Eucharist, on account of their natural aversion to wine.

ABSTEMIOUS *a.* (*abstemius*, Lat.) Temperate, sober; abstinent (*Arbuthnot*).

ABSTEMIOUSLY *ad.* (from *abstemious*.) Temperately, soberly, without indulgence.

ABSTEMIOUSNESS *s.* The quality of being abstemious.

ABSTENTION *s.* (from *abstineo*, Lat.) The act of holding off, or restraining.

To ABSTERGE. *v. a.* (*abstergo*, Lat.) To cleanse by wiping.

ABSTERGENT *a.* Cleansing, having a cleansing quality.

ABSTERGENTS (*abstergentia*.) Medical or chirurgical applications that clear away foulnesses from ulcers or abscesses.

To ABSTERSE *v. a.* (See ABSTERGE.) To cleanse, to purify: not in use (*Brown*).

ABSTERSION *s.* (*abstersio*, Lat.) The act of cleansing (*Bacon*).

ABSTERSIVE *a.* (from *absterge*.) That has the quality of absterging or cleansing (*Bacon*).

ABSTINENCE may be defined, the habit of refraining from what is either useful, agreeable, or pernicious, and may be divided into general and particular. In the former sense, it may signify a certain privation, whereby the senses are mortified and the passions restrained. In the latter, it is confined to the exclusion of certain substances at stated times and seasons, in compliance either with the customs of particular countries, or with religious precepts. There is, also, another sense, in which the term abstinence denotes the limitation of any usual indulgence, for the purpose of preserving health, and removing the consequences of excess. In the religious institutions of all countries, we find many regulations on this subject. The Mosaic law forbids the eating of animals that were strangled, the use of swine's flesh, the exercise of daily labour on the Sabbath, &c. The Christian system more particularly enjoins the discipline of the passions, and an abstinence from those pleasures which have a tendency to degrade our nature. In England, particular days have been appointed, called vigils and fasts, in which flesh is prohibited, and fish enjoined: this, however, being more a political restriction than a religious obligation, was first adopted in the reign of queen Elizabeth, with a view to encourage our fisheries. Of the brute animals, many are remarkable for their long abstinence from food, such as the serpent, the rattle-snake, tortoise, bear, dormouse, elephant, &c. Instances may also be found of men who have been abstemious to a degree almost incredible, and experience has demonstrated that, from habit and use, the power of abstinence may be either increased or diminished. Some persons will bear the attacks of hunger without any visible marks of impatience, while in others, a mere temporary privation will occasion the most urgent and distressing symptoms.

ABSTINENT *a.* (*abstinens*, Lat.) That uses abstinence.

ABSTINENTS, or ABSTINENTES, a set of heretics that opposed marriage, condemned the use of flesh meat, and placed the Holy Ghost in the class of created beings.

To ABSTRACT *v. a.* (*abstraho*, Lat.) 1. To take one thing from another. 2. To separate ideas (*Locke*). 3. To reduce to an epitome (*Watts*).

A'BSTRACT *a.* (*abstractus*, Lat.) Separated from something else: generally used with relation to mental perceptions, as, *abstract* mathematics (*Wilkins*).

ABSTRACT IDEA, in metaphysics, is a partial idea of a complex object, limited to one or more of the component parts or properties, laying aside or abstracting from the rest. See ABSTRACTION.

ABSTRACT TERMS, words that are used to express abstract ideas. Thus beauty, ugliness, &c. are abstract terms.

ABSTRACT MATHEMATICS, otherwise called PURE MATHEMATICS, is that which treats of magnitude or quantity, absolutely and generally considered, without restriction to any species of particular magnitude, such are Arithmetic and Geometry.

ABSTRACT NUMBERS, are assemblages of units, considered in themselves without denoting any determined particulars. Thus 6 is an abstract number, when not applied to any thing; but if we say 6 feet, 6 becomes a concrete number.

ABSTRACT *s.* (from the verb.) 1. A smaller quantity, containing the virtue or power of a greater (*Shaksp.*). 2. An epitome made by taking out the principal parts (*Watts*). 3. The state of being abstracted (*Wotton*).

ABSTRACTED *p. a.* (from *abstract*.) 1. Separated, disjoined (*Milt.*). 2. Refined, purified (*Donne*). 3. Abstruse, difficult. 4. Absent of mind.

ABSTRACTEDLY *ad.* With abstraction, simply, separately from all contingent circumstances (*Dryd.*).

ABSTRACTION *s.* (*abstractio*, Lat.) 1. The act of abstracting (*Watts*). 2. The state of being abstracted. 3. Absence of mind, inattention. 4. Disregard of worldly objects (*Pope*).

ABSTRACTION in metaphysics, an operation of the mind, whereby we separate things naturally conjunct or existing together and form, and consider, ideas of things thus separated. The faculty of abstracting stands directly opposite to that of compound-

ing By composition we consider those things together, which in reality are not joined together in one existence And by abstraction we consider those things separately and apart, which in reality do not exist apart Abstraction is chiefly employed these three ways — First, when the mind considers any one part of a thing, in some respect distinct from the whole, as a man's arm, without the consideration of the rest of his body Secondly, when we consider the mode of any substance omitting the substance itself, or when we separately consider several modes which subsist together in one subject This abstraction the geometricians make use of, when they consider the length of a body separately, which they call a line, omitting the consideration of its breadth and depth Thirdly, it is by abstraction that the mind frames general, or universal ideas; omitting the modes and relations of the particular objects whence they are formed —Thus, when we would understand a thinking being in general, we gather from our self-consciousness what it is to think, and omitting the consideration of those things which have a peculiar relation to our own mind, or to the human mind, we conceive of a thinking being in general Ideas framed thus, which are what we properly call abstract ideas, become general representatives of all objects of the same kind, and their names applicable to whatever exists conformable to such ideas — Thus, the colour that we receive from chalk, snow, milk, &c is a representative of all of that kind, and has a name given it *whiteness*, which signifies the same quality wherever found or imagined It is this the faculty or power of abstracting, according to Mr Locke, that makes the great difference betwixt man and brutes, for even the latter must be allowed to have some share of reason that they really reason in some cases, [illegible] it is evident as that they have sense, but it is only in particular ideas They are tied up to those narrow bounds and do not seem to have any faculty of enlarging them by abstraction (Essay on Human Understanding, lib ii cap 11 lib iii cap 3) Such is the doctrine of abstract ideas, under the improvements of that excellent author —In effect it is the standing opinion, that the mind has such a power or faculty of framing abstract ideas or notions of things, and on such very idea do a great part of the writings of philosopher turn These are supposed in all their systems, and without them there would be nothing done —They are more especially reputed the object of logic, mathematics, and metaphysics, and all that passes under the notion of the most abstracted and sublime learning

Abstracting, on the common system, is no more than generalising it is making one thing stand for an hundred, by omitting the consideration of the differences between them [illegible] taking several differents, i e different combinations, setting aside the peculiarities in each and considering only what is found alike in all —Thus it is that I say I love my friend, love my mistress love myself, my bottle, my book, my ease, &c —Not that it is possible I should have the same perception with respect to so many different sorts of things, that stand in such different relations to me, but only that there appearing something in them all that bears a resemblance to the rest, in some circumstance or other, I choose to express all by one name *love* For if I consider the tendency and effect of them all, I shall find they lead me very different ways, to very different actions, and the analogy there is between them, is a sort of pleasure or satisfaction, arising upon the application of the particular object to its proper organ or sense The abstract idea of love, then will terminate in the idea of pleasure but it is certain there can be no ideas of pleasure, without a thing pleasant to excite it Any other abstract idea of pleasure, will amount to no more than a view or perception of the circumstances wherewith our pleasures have been attended but these are mere external foreign to the pleasurable sensation itself, which nothing but an object applied in such and such a manner can excite To suppose an idea of pleasure produced indirectly, by any other than the proper cause, is as absurd as to suppose an idea of sound produced without a sonorous object The mind has no power of making any ideas, call them what you will, whether abstract or concrete or general, or particular, its activity goes no farther than to the perceiving of such as are presented to it, so that its action is really no other than a degree of passion

Abstraction in chemistry, the act of separating, by heat, one part of a compound from the other If the abstracted part be collected, the process becomes distillation, if not, it is the same with evaporation The term is, at present, almost entirely confined to the repeated distillation of nitrous acid of any substance, which is then said to have been abstracted *with* the acid

ABSTRACTITIOUS SPIRITS in chemistry are those which are drawn from vegetables without fermentation

ABSTRACTIVE *a* (from *abstract*) Having the power or quality of abstracting

ABSTRACTLY *ad* (from *abstract*) In an abstract manner, absolutely (*Bent*)

ABSTRACTNESS *s* (from *abstract*) Subtilty, separation from all matter or common notions (*Locke*)

ABSTRUSE *a* (*abstrusus*, Lat) 1 Hidden (*Milt*) 2 Difficult; remote from conception or apprehension (*Milt*)

ABSTRUSELY *ad* Obscurely, not plainly, or obviously

ABSTRUSENESS *s* (from *abstruse*) Difficulty; obscurity (*Boyle*)

ABSTRUSITY s 1 Abstruseness. 2 That which is abstruse (*Brown*)

To ABSUME v a (*absumo*, Lat) To bring to an end by a gradual waste (*Hale*)

ABSURD a (*absurdus*, Lat) 1 Unreasonable, without judgment (*Bacon*) 2 Inconsistent, contrary to reason (*South*)

ABSURDITY s (from *absurd*) 1 The quality of being absurd (*Locke*) 2 That which is absurd (*Add*)

ABSURDLY ad (from *absurd*) Improperly; unreasonably (*Swift*)

ABSURDNESS s The quality of being absurd, injudiciousness, impropriety

Reductio ad ABSURDUM among logicians and mathematicians, a method of proving the truth of a proposition, by shewing that the contrary is absurd. Thus in the 11th and 12th propositions of Euclid's third book this kind of proof is adopted to shew that if two circles touch one another, either externally or internally, the straight line which joins their centres, or that line produced, shall pass through the point of contact for Euclid shews, that on any other supposition than that stated in the proposition, it would follow that one line would be both greater and less than another at the same time *which is absurd*

ABTHANES, a title of honour used by the ancient inhabitants of Scotland, who called their nobles *Thanes*, which in the old Saxon signifies *kings ministers* of these the higher rank were styled *Abthanes* the lower *Underthanes*

ABUNDANCE s (*abondance*, Fr) 1 Plenty (*Crashaw*) 2 Great numbers (*Add*) 3 A great quantity (*Hal*) 4 Exuberance, more than enough (*Spen*)

ABUNDANT a (*abundans*, Lat) 1 Plentiful (*Milt*) 2 Exuberant (*Add*) Fully stored with it (*Bur*)

ABUNDANT NUMBER, in arithmetic, is a number whose aliquot parts, added all together, make a sum which is greater than the number itself. Thus 12 is an abundant number, because its aliquot parts, namely 1, 2, 3, 4, 6 when added together make 16, which is greater than the number 12 itself

ABUNDANTLY ad (from *abundant*) 1 In plenty (*Gen*) 2 Amply, liberally, more than sufficiently

To ABUSE v a (*abutor* Lat) In *abuse* the verb, s has the sound of z, in the noun, the common sound 1 To make an ill use of (1 *Cor*) 2 To deceive to impose upon (*Bacon*) 3 To treat with rudeness (*Shaks*)

ABUSE s (from the verb *abuse*) 1 The ill use of any thing (*Hooker*). 2 A corrupt practice, bad custom (*Swift*) 3 Seducement (*Sid*). 4. Unjust censure, rude approach (*Milt*)

ABUSER s (pronounced *abuzer*) 1 He that makes an ill use. 2. He that deceives (*Den*). 3 He that reproaches with rudeness 4 A ravisher, a violator

ABUSIVE a (from *abuse*) 1. Practising abuse (*Pope*) 2 Containing abuse (*Rosc*) 3 Deceitful (*Bacon*)

ABUSIVELY ad (from *abuse*) 1 Improperly, by a wrong use (*Boyle*) 2 Reproachfully (*Herb*)

To ABUT v n Obsolete (*aboutir*, to touch at the end, Fr) To end at, to border upon to meet or approach to

ABUTILLON *of Tourn* Indian mallow See SIDA

ABUTILLON OF DILL and ELTH Carolina mallow See MALVA

ABUTMENT s (from *abut*) That which abuts, or borders upon another

ABUTTALS s Among lawyers, the buttings, or boundings of a piece of land In Coke the plaintiff is said to "fail in his abuttal," i e in shewing how the land is bounded

ABYDOS, a town and castle of Natolia, in Lesser Asia Here the streight, which is called Gallipoli, and which divides Europe from Asia, is two miles over All ships coming out of the Archipelago are searched here Lat 40 16 N Lon 37 36 E

ABYLA, one of Hercules's pillars on the African side, over against Calpe in Spain, the other pillar

ABYSM s (*abysme*, old Fr) A gulf the same with *abyss* (*Shaks*)

ABYSS s (*abyssus* Lat ἄβυσσος, bottomless, Gr) 1 A depth without bottom (*Milt*) 2 A great depth a gulf (*Dry*) 3 That in which any thing is lost (*Locke*) 4 The body of waters supposed at the centre of the earth (*Bur*) 5 In the language of divines, hell (*Rosc*) In the fourth sense above, the existence of an abyss, or receptacle of subterraneous water, is controverted by Cameratius, but warmly defended by Dr Woodward Its existence is however, in our opinion far from demonstrated and it appears in some respects inconsistent with sound philosophy

ABYSS is also used in heraldry A thing is said to be born in abyss, *en abysme*, when placed in the middle of the shield, clear from any other bearing.

ABYSS, in antiquity, the name given to the temple of Proserpine

ABYSSINIA, called also HIGHER ETHIOPIA, and by the Arabians AL HABASH, is bounded on the north by Nubia, on the east by the Arabian gulf, or Red sea, and the kingdom of Adel; on the south by the kingdoms of Ajan, Alaba, and Gingiro; and on the west by the kingdom of Goram, and part of Gingiro In this country the famous river Nile has its source On the mountains the air is pretty temperate, therefore their towns and fortresses are generally placed on them, but in the valleys the heat is intense The torrents of water in the rainy seasons wash a great deal of gold from the mountains These seasons commence in May, and end in Sep-

tember. The inhabitants of this country, in general, are of an olive complexion, tall, graceful, and well featured. Their language is the Ethiopic, which bears a great affinity to the Arabic. Gold, silver, copper, and iron, are the principal ores which abound there; but not above one-third part of their gold is converted into money, or used in trade.

ABYSSINIAN is used as the name of a sect, in the Christian church, established in the empire of Abyssinia. The Abyssinians are a branch of the Cophts, or Jacobites, with whom they agree in admitting only one nature in Jesus Christ, and rejecting the council of Chalcedon: whence they are also called Monophysites, and Eutychians. The Abyssinian church is governed by a bishop, or metropolitan, styled *abuna*, sent them by the Coptic patriarch of Alexandria residing at Cairo, who is the only person that ordains priests. They have canons also, and monks; the former of whom marry, the latter at their admission vow celibacy, but with a reservation. Le Grand says, they make a promise aloud before their superior, to keep chastity, but add in a low voice, *as you keep it*. The emperor has a kind of supremacy in ecclesiastical matters. They have at least as many miracles, and legends of saints, as the Romish church; which proved no small embarrassment to the Jesuit missionaries, to whom they produced so many miracles, wrought by their saints, in proof of their religion, and those so well circumstantiated and attested, that the Jesuits were obliged to deny miracles to be any proof of a true religion, and in proof hereof to allege the same arguments against the Abyssinians, which protestants in Europe allege against the papists. Ludolf allows that they believe the real presence after the Lutheran manner, but denies that they hold transubstantiation, though Renaudot asserts, that they maintain it. They pray for the dead, and invoke saints and angels; have so great a veneration for the Virgin, that they charged the Jesuits with not rendering her honour enough. Images in painting they venerate, but abhor all those in relievo, except the cross. They hold that the soul of man is not created, because, say they, God finished all his work on the sixth day. They admit the apocryphal books, and the canons of the apostles, as well as the apostolical constitution, for genuine. Their liturgy is given by Alvarez, and in English by Pagit; their calendar by Ludolf.

ACACIA (ακακια, from ακαζω, to sharpen). A name given to various species of the MIMOSA, which see. Of the species that have been employed in medicine, the following are the chief: 1. Acacia germanica, or acacia nostras. Prunus sylvestris, Prunus spinosa of Linnéus. The wood or wild sloe. The inspissated juice of this fruit was once a favourite rob. 2. Acacia vera, Mimosa nilotica of Linnéus. The juice of this was employed like that of the acacia germanica. They both possess astringent virtues, and were formerly esteemed in dysenteries, and diarrhœas, from relaxation of the intestine canal. The last is the gum-arabic tree. 3. Acacia Indiana, the tamarind tree. 4. Acacia Zeylanica, lignum campechense or log wood.

ACACIA, *false*. See ROBINIA.

ACACIA, *German*. See PRUNUS.

ACACIA, *three thorned*. See GLEDITSIA.

ACACIA, among antiquaries, something resembling a roll or bag, seen on medals, as in the hands of consuls, emperors, &c.

ACACIANS, in church history, the followers of Acacius, bishop of Cæsarea, who flourished about the middle of the fourth century. Some of them maintained, that the Son was not of the same, but of a similar substance with the Father; others held that he was of a different substance from the Father. This was likewise the denomination of another sect, derived from the name of their leader, a patriarch of Constantinople, in the fifth century, who favoured the opinion of Eutyches. See EUTYCHIANS.

ACADEMIA MUSICALE (Ital. *musical academy*). A term long since applied, by the Italians, to certain musical meetings, held under a directing leader, for the purpose of amusement and practical improvement. The earliest *academia musicale* of which we have any account was instituted at Vicenza, about the year 1500, and called the *Academia degli Filarmonici*. An academy of music was instituted at Paris in the year 1669. In England the first institution of this kind took place in the year 1710, at the Crown and Anchor Tavern, Strand. And in 1720 there was formed, by subscription, an ACADEMY ROYAL OF MUSICIANS, under the patronage of king George the First.

ACADEMIAL. *a.* (from *academy*). Relating to an academy.

ACADEMIAN. *s.* (from *academy*). A scholar of an academy or university (*Wood*).

ACADEMICAL. *a.* (*academicus*, Lat.). Belonging to an university (*Wotton*).

ACADEMICIAN. *s.* (*academicien*, Fr.). The member of an academy.

ACADEMICS, a sect of philosophers, who followed the doctrine of Socrates and Plato, as to the uncertainty of knowledge, and the incomprehensibility of truth. Academic, in this sense, amounts to much the same with Platonist, the difference between them being only in point of time. They who embraced the system of Plato, among the ancients, were called *academics*, whereas those who did the same since the restoration of learning, have assumed the denomination of Platonists. We usually reckon three sects of academics, though some make five.—The ancient academy was that whereof Plato was the chief. (See PLATONISM.) Arcesilas, one of his successors, introducing some alterations into the philoso-

phy of this sect, founded what they call the second academy. The establishment of the third, called also the *new academy*, is attributed to Lacydes, or rather to Carneades. Some authors add a fourth, founded by Philo, and a fifth by Antiochus, called the *Antiochian*, which tempered the ancient academy with Stoicism. Before the days of Plato, philosophy had in a great measure fallen into contempt. The contradictory systems and hypotheses which had successfully been urged upon the world were become so numerous, that, from a view of this inconsistency and uncertainty of human opinions, many were led to conclude that truth lay beyond the reach of our comprehension. Absolute and universal scepticism was the natural consequence of this conclusion. In order to remedy this abuse of philosophy and of the human faculties, Plato laid hold of and refuted the principles of the academical philosophy. Of the sceptics of our own country, Berkeley and Hume are the most considerable. Berkeley denied the existence of every thing excepting his own ideas. Mr Hume has gone a step further, and questioned even the existence of ideas; but at the same time has not hesitated to give determined opinions with regard to eternity, Providence, and a future state, miraculous interpositions of the Deity, &c. subjects far above the reach of our faculties. In his essay on the academical or sceptical philosophy, he has founded two very opposite species of philosophy. After the days of Plato, indeed, the principles of the first academy were grossly corrupted by Arcesilaus, Carneades, &c. This might lead Mr Hume into the notion that the academical and sceptical philosophy were synonymous terms. But no principles can be of a more opposite nature than those which were inculcated by the old academy of Socrates and Plato, and the sceptical notions which were propagated by Arcesilaus, Carneades, and the other disciples of the succeeding academies.

ACADEMICS, in a large sense, is applied to the members of an academy, or of a college.

ACADEMIST. The same as ACADEMIC or ACADEMICIAN.

ACADEMUS or ECADEMUS, an Athenian citizen, whose house and [illegible] employed as a philosophical school. In the time of Theseus, he had the honour of giving a name to a sect of philosophers, or rather three sects, called *Academics*.

ACADEMY, in antiquity, a garden, villa, or grove, near Athens, where the philosophers delivered their instructions, and their followers held their conferences. The name academy is taken from Ecademus, the original owner of the ground, who lived in the time of Theseus. The academic gardens occupied a surface somewhat exceeding a mile square, in the environs of Athens, and extended from the banks of the Ilissus to those of the Cephisus. The centre belonged to the disciples of Epicurus; southwards were those of Aristotle, and northwards the followers of Plato, to whose garden the term academy has been generally confined. Each sect was distinguished by peculiar manners and characteristics, yet never did sects discover less turbulence, or neighbours fewer jealousies. An alley of olive-trees, or a thicket of myrtles, separated the dominions of system, and served as boundaries to the empire of opinions. The philosophers retained these possessions until Greece fell under the yoke of the Roman Catholics: at the unusual sight of priests and monks armed with axes and torches, philosophy abandoned the regions of Greece, and that reign of darkness succeeded, which still continues there.

ACADEMY, among the moderns, denotes a regular society or company of learned persons, instituted under the protection of some prince, or other public authority, for the cultivation and improvement of arts or sciences. Some authors confound academy with university; but though much the same in Latin, they are very different things in English. An university is properly a body composed of graduates in the several faculties; of professors, who teach in the public schools; of regents, or tutors; and students who learn under them, and aspire likewise to degrees. Whereas an academy is not intended to teach or profess any art or science, but to improve it: it is not for novices to be instructed in, but for those that are more knowing; for persons of learning to confer in, and communicate their lights and discoveries to each other, for their mutual benefit and improvement.

The first modern academy we read of, was established by Charlemagne, by the advice of Alcuin an English monk: it was composed of the chief geniuses of the court, the emperor himself being a member. In their academical conferences, every person was to give some account of the ancient authors he had read; and each one assumed the name of some ancient author that pleased him most, or some celebrated person of antiquity. Alcuin, from whose letters we learn these particulars, took that of Flaccus, the surname of Horace; a young lord, named Angilbert, took that of Homer; Adelard, bishop of Corbie, was called Augustin; Recluse, bishop of Mentz, was Damoetas; and the king himself David. Most nations have now their academies, but Italy has by far the greatest number. The French have many flourishing academies, most of which were established by Louis XIV. We have but few in Britain; and those of the chiefest note go by a different name. There are, however, in London, the Academy of Painting, and that of Music, established by letters-patent, and governed by their respective directors. In giving an account of the principal academies, it seems most proper to arrange them according to their subjects.

I. *Medical Academies*, as that of the Naturæ Curiosi in Germany; that founded at Palermo in 1645, another at Venice in 1701, which meets weekly in a hall near the grand hospital, another at Geneva in 1715, in the house of M. Le Clerc. The colleges of physicians at London and Edinburgh are also, by some, ranked in the number of academies (See COLLEGE.) The academy of *Naturæ Curiosi*, called also the Leopoldine academy, was founded in 1652, by Jo. Laur. Bauschius, a physician; who, in imitation of the English, published an invitation to all physicians to communicate their extraordinary cases; and, meeting with success, was elected president. Their works were at first published separately; but in 1670 a new scheme was laid for publishing a volume of observations every year. The first volume appeared in the year 1684, under the title of Ephemerides; and the work has been continued with some interruptions and variations of the title, &c. In 1687, the emperor Leopold took the society under his protection, granting the members several privileges, particularly that their presidents should be counts palatine of the holy Roman empire. This academy has no fixed residence or regular assemblies; instead of these, there is a kind of bureau, or office, first established at Breslau, and afterwards removed to Nuremberg, where letters, observations, &c. from correspondents or members are taken in. The academy consists of a president, two adjuncts or secretaries, and colleagues or members without restriction. The colleagues, at their admission, oblige themselves to two things; first, to choose some subject out of the animal, vegetable, or mineral kingdom, to handle, provided it had not been treated of by any colleague before; the second, to apply themselves to furnish materials for the annual Ephemerides. Each member to bear a symbol of the academy, viz. a gold ring, whereon, instead of a stone, is a book open, and, on the face thereof, an eye; on the other side, the motto of the academy, *Nunquam otiosus*.

II. *Chirurgical Academies*, as that instituted some years ago, by public authority, at Paris; the members of which were not only to publish their own and correspondents observations and improvements, but to give an account of all that is published on surgery; and to compose a complete history of the art, by their extracts from all the authors, ancient and modern, who have wrote on it. A question in surgery is annually proposed by the academy, and a gold medal of two hundred livres value given to him who furnishes the most satisfactory answer.

III. *Ecclesiastical Academies*, as that at Bologna in Italy instituted in 1687, employed in the examination of the doctrine, discipline, and history of each age of the church.

IV. *Cosmographical Academies*, as that at Venice, called the *Argonauts*. This was instituted at the solicitation of F. Coronelli, for the improvement of geographical knowledge. Its design was to publish exact maps, both celestial and terrestrial, as well particular as general, together with geographical, historical, and astronomical descriptions. Each member, in order to defray the expence of such a publication, was to subscribe a proportional sum, for which they were to receive one or more copies of each piece published. For this end, three societies are settled; one under F. Moro, provincial of the Minorites in Hungary; another under the abbot Laurence, au Rue Pavenne au Marais; the third under F. Baldigiani, jesuit professor of mathematics in the Roman college. The device of this academy is the terraqueous globe, with the motto *Plus ultra*; and at its expence all the globes, maps, and geographical writings, of F. Coronelli have been published.

V. *Academies of Sciences*. These comprehend such as are erected for improving natural and mathematical knowledge. They are otherwise called *Philosophical* and *Physical Academies*. The first of these was instituted at Naples, about the year 1560, in the house of Baptista Porta. It was called the Academy *Secretorum Naturæ*; and was succeeded by the Academy of *Lyncei*, founded at Rome by Prince Frederic Cesi towards the end of that century. Several of the members of this academy rendered it famous by their discoveries, among these was the celebrated Galileo. Several other academies were instituted about that time, which contributed greatly to the advancement of the sciences; but none of them comparable to that of the *Lyncei*. Some years after the death of Torricelli, the *Academy del Cimento* made its appearance under the protection of prince Leopold, afterwards cardinal de Medicis. Redi was one of its chief members; and the studies pursued by the rest may be collected from those curious experiments published in 1667, by their secretary count Laurence Magalotti, under the title of *Saggi di Naturalli Esperienze*; a copy of which was presented to the Royal Society, translated into English by Mr Waller, and published at London in quarto.

The *Academy degl' Inquieti*, afterwards incorporated into that of Della Traccia in the same city, followed the example of that of Del Cimento. Some excellent discourses on physical and mathematical subjects, by Geminiano Montenari, one of the chief members, was published in 1667, under the title of *Pensieri Fisico Matematici*.

The *Academy of Rossano*, in the kingdom of Naples, was originally an academy of Belles Lettres, founded in 1640, and transformed into an Academy of Sciences in 1695, at the solicitation of the learned abbot, Don Giacinto Gimma; who being made president, under the title of Promoter General thereof,

gave them a new set of regulations He divided the academists into the following classes grammarians, rhetoricians, poets, historians, philosophers, physicians, mathematicians, lawyers, and divines, with a class apart for cardinals and persons of quality Several other academies of sciences have been founded in Italy, but, for want of being supported by princes, did not continue long The loss of them, however, was abundantly repaired by the institution of others still subsisting, such as, the *academy of Filarmonici* at Verona, of *Ricovrati* at Padua, where a learned discourse on the origin of springs was delivered by sig Vallisnieri, first professor of physic in the university of that city, and which was afterwards printed To the academy of the *Muti de Regio*, at Modena, the same sig Vallisnieri presented an excellent discourse on the scale of created beings, since inserted in his history of the generation of man and animals printed at Venice in the year 1721. F Mersenne is said to have given the first idea of a philosophical academy in France, towards the beginning of the seventeenth century, by the conferences of naturalists and mathematicians occasionally held at his lodgings, at which Gassendi, Des Cartes, Hobbes, Roberval Pascal, Blondel, and others, assisted F Mersenne proposed to each certain problems to examine, or certain experiments to be made These private assemblies were succeeded by more public ones, formed by Mr Montmort, and Mr Thevenot, the celebrated traveller The French example animated several Englishmen of distinction and learning to erect a kind of philosophical academy at Oxford, towards the close of Oliver Cromwell's administration, which, after the Restoration, was erected into a Royal Society (See SOCIETY) The English example, in its turn, animated the French Lewis XIV in 1666, assisted by the counsels of Mr Colbert, founded an academy of Sciences at Paris, with a sufficient revenue to defray the charge of experiments, and salaries to the members

Royal Academy of Sciences.—After the peace of the Pyrenees, Lewis XIV being desirous of establishing the arts, sciences, and literature, upon a solid foundation, directed M Colbert to form a society of men of known abilities and experience in the different branches, who should meet together under the king's protection, and communicate their respective discoveries Accordingly Mr Colbert, having conferred with those who were at that time most celebrated for their learning, resolved to form a society of such persons as were conversant in natural philosophy and mathematics, to join to them other persons skilled in history and other branches of erudition, along with those who were entirely engaged in what are called the *Belles Lettres*, grammar, eloquence, and poetry. All the different classes were ordered to meet together upon the first Thursday of every month, and, by their respective secretaries, make a report of the proceedings of the foregoing month. In a short time, however, the classes of History, Belles Lettres, &c were united to the French Academy, which was originally instituted for the improvement and refining the French language, so that the Royal Academy contained only two classes, viz. that of natural philosophy and mathematics In the year 1669 the king, by a proclamation dated the 26th of January, gave this academy a new form, and put it upon a more respectable footing —It was now to be composed of four kinds of members, viz honorary, pensionary, associates, and eleves These last were a kind of pupils, or scholars, each of whom was attached to one of the pensionaries The first class to contain ten persons, and each of the rest twenty The honorary academists to be all inhabitants of France, the pensionaries all to reside at Paris, eight of the associates allowed to be foreigners, and the eleves all to live at Paris The officers to be, a president named by the king, out of the class of honorary academists, and a secretary and treasurer, to be perpetual Of the pensionaries, three to be geometricians, three astronomers, three mechanics, three anatomists, three chemists, three botanists, and the remaining two to be secretary and treasurer. Of the twelve associates, two to apply themselves to geometry, two to botany, and two to chemistry. The eleves to apply themselves to the same kind of science with the pensionaries they were attached to, and not to speak, except when called by the president No regular or religious to be admitted, except into the class of honorary academists, nor any person to be admitted either for associate or pensionary, unless known by some considerable printed work, some machine, or other discovery To encourage the members to pursue their labours, the king engaged not only to pay the ordinary pensions, but even to give extraordinary gratifications, according to the merit of their respective performances, furnishing withal the expence of the experiments and other enquiries necessary to be made If any member gave in a bill of charges of experiments he had made, or desired the printing of any book, and brought in the charges of graving, the money was immediately paid by the king, upon the president's allowing and signing the bill So, if an anatomist required live tortoises, for instance, for making experiments about the heart, &c. as many as he pleased were brought him at the king's charge Their motto was, *Invenit et perfecit* In the year 1716, the Duke of Orleans, then regent, made an alteration in their constitution, augmenting the number of honoraries, and of associates capable of being foreigners, to twelve, admitting regulars among such associates, and suppressing the class of eleves, as it appeared to be attended with some inconveni-

ences, particularly that of making too great an inequality among the academists, and being productive of some misunderstandings and animosities among the members At the same time he created other two classes, one consisting of twelve adjuncts, who, as well as the associates, were allowed a deliberative voice in matters relative to science, and the other six free associates, who were not attached to any particular science, nor obliged to pursue any particular work After its re-establishment in 1699, this academy was very exact in publishing, every year, a volume containing either the works of its own members, or such memoirs as had been composed and read to the academy during the course of that year To each volume is prefixed the history of the Academy, or an extract of the memoirs, and, in general, of whatever has been read or said in the academy, at the end of the history, are the eulogiums on such academists as have died that year —M Rouille de Meslay, counsellor to the parliament of Paris, founded two prizes, one of two thousand five hundred, and the other of two thousand livres, which are alternately distributed by the parliament every year, the subject for the first must relate to physical astronomy, and those for the latter to navigation and commerce Notwithstanding the advantages which the members of this academy enjoyed over others, in having their expences defrayed, and even being paid for their time and attendance, they have fallen under some imputations, particularly that of plagiarism The French revolution, however occasioned this Academy to be new modelled see INSTITUTE

The *Royal Society at Berlin* was founded in 1700, by Frederic II king of Prussia, on the model of that of England, excepting that, besides natural knowledge, it likewise comprehends the Belles Lettres In 1710 it was ordained that the president shall be one of the counsellors of state, and nominated by the king The members were divided into four classes, the first for prosecuting physics, medicine, and chemistry; and the second for mathematics, astronomy, and mechanics, the third for the German language and the history of the country, the fourth for oriental learning, particularly as it may concern the propagation of the gospel among infidels Each class to elect a director for themselves, who shall hold his post for life The members of any of the classes have free admission into the assemblies of any of the rest The great promoter of this institution was the celebrated Mr Leibnitz, who accordingly was made the first director The first volume of their Transactions was published in 1710, under the title of *Miscellanea Berolinensia* Frederic III the late king of Prussia, gave new vigour to this academy, by inviting to Berlin such foreigners as were most distinguished for their merit in literature, and encouraged his subjects to prosecute the study and cultivation of the sciences by giving ample rewards, and thinking that the academy, which till that time had had some minister or opulent nobleman for its president, would find an advantage in having a man of letters at its head, he conferred that honour on M Maupertuis At the same time, he gave a new regulation to the academy, and took upon himself the title of its protector

The *Imperial Academy at Petersburgh* was projected by Czar Peter the Great, who had taken the necessary measures for its establishment, when he was prevented by death from putting them into execution His successor, the Czarina Catherine, laboured on the same plan; and in a short time formed one of the most celebrated academies in Europe, composed of the most considerable foreigners, some of them settled at Petersburgh The memoirs of this academy, which are published in Latin, are highly valuable, particularly for the mathematical part The academy, however, was in a very languishing condition, when the Empress Czarina Elizabeth ascended the throne, but that princess, happily, naming Count Rasomowski president, he gave it a new body of statutes and quickly restored it to its ancient splendour The building and apparatus of this academy are extraordinary there being a fine library, observatory &c It partakes much of what we call an University having regular professors in the several faculties who read lectures as in our schools The ordinary assemblies are held twice a-week, and public or solemn ones thrice a-year. In the public assemblies an account is given of what has been done in the private ones The academy has this modest motto "*Paulatim*"

The *Academy of Sciences*, called the *Institute of Bologna*, was founded by count Marsigli in 1712, for the cultivating of physics, mathematics, medicine, chemistry, and natural history Its history is written by M de Limiers, from memoirs furnished by the founder himself

American Academy of Arts and Sciences, was established in 1780 by the council and house of representatives in the province of Massachuset's Bay for promoting the knowledge of the antiquities of America, and of the natural history of the country, for determining the uses to which its various natural productions may be applied, for encouraging medicinal discoveries, mathematical disquisitions, philosophical enquiries and experiments, astronomical, meteorological, and geographical observations, and improvements in agriculture, manufacture, and commerce; and, in short, for cultivating every art and science, which may tend to advance the interest, honour, dignity, and happiness of a free, independent, and virtuous people The members of this academy are never to be less than forty, nor more than two hundred

VI. *Academies of Law*, as that famous one at Beryta, and that of the Sitientes at Bologna.

VII. *Academies of History*, as the *Royal Academy of Portuguese History* at Lisbon. This academy was instituted by King John V. in 1720. It consists of a director, four censors, a secretary, and fifty members, to each of which is assigned some part of the ecclesiastical or civil history of the nation, which he is to treat either in Latin or Portuguese. In the church-history of each diocese, the prelates, synods, councils, churches, monasteries, academies, persons illustrious for sanctity or learning, places famous for miracles or relics, must be distinctly related in twelve chapters. The civil history comprises the transactions of the kingdom from the government of the Romans down to the present time. The members who reside in the country are obliged to make collections and extracts out of all the registers, &c. where they live. Their meetings to be once in fifteen days. A medal was struck by this academy in honour of their prince: the front of which was his effigy, with the inscription *Johannes V. Lusitanorum Rex*; and, on the reverse, the same prince is represented standing, and raising History almost prostrate before him, with the legend *Historia Resurges*. Underneath are the following words in abbreviature: REGia ACADemia HIStoriae LUSITanae INSTITUTa VI. Idus Decembris MDCCXX.

VIII. *Academies of Antiquities*, as that at Cortona in Italy, and at Upsal in Sweden. The first is designed for the study of Hetrurian antiquities; the other for illustrating the northern languages, and the antiquities of Sweden, in which notable discoveries have been made by it. The head of the Hetrurian Academy is called *Lucomon*, by which the ancient governors of the country were distinguished. One of their laws is to give audience to poets only one day in the year; another is to fix their sessions, and impose a tax of a dissertation on each member in his turn.

The *Academy of Medals and Inscriptions* at Paris was set on foot by M. Colbert, under the patronage of Lewis XIV. in 1663, for the study and explanation of ancient monuments, and perpetuating great and memorable events, especially those of the French monarchy, by coins, relievos, inscriptions, &c. The number of members at first was confined to four or five, chosen out of those of the French Academy, who met in the library of Mr. Colbert, from whom they received his majesty's orders. By a new regulation, dated the 16th of July, 1701, the academy was composed of ten honorary members, ten associates, each of whom had two deliberative voices, ten pensionaries; and ten eleves, or pupils. They then met every Tuesday and Wednesday, in one of the halls of the Louvre, and had two public meetings yearly, one the day after Martinmas and the other the sixteenth after Easter. The class of eleves has been suppressed, and united to the associates. The king nominates their president and vice-president yearly; but their secretary and treasurer are perpetual. The rest are chosen by the members themselves, agreeably to the constitutions on that behalf given them.

IX. *Academies of Belles Lettres*, are those wherein eloquence and poetry are chiefly cultivated. They are very numerous in Italy, and not uncommon in other countries.

The *Academy of Umidi* at Florence has contributed greatly to the progress of the sciences by the excellent Italian translations given by some of its members, of the ancient Greek and Latin historians. Their chief attention is to the Italian poetry, at the same time that they have applied themselves to the polishing of their language, which produced the *Academia La Crusca*.

The *Academy of Humorists*, *Humoristi*, had its origin at Rome from the marriage of Lorenzo Mancini, a Roman gentleman, at which several persons of rank were guests; and, it being carnival time, to give the ladies some diversion they betook themselves to the reciting of verses, sonnets, speeches, first *ex tempore*, and afterwards premeditately; which gave them the denomination of *Belli Humori*. After some experience, coming more and more into the taste of these exercises, they resolved to form an Academy of Belles Lettres, and changed the title of *Belli Humori* for that of *Humoristi*, choosing for their device a cloud which, after being formed of exhalations from the salt waters of the ocean, returns in a gentle sweet shower, with this motto from Lucretius, *Redit agmine dulci*. In 1690, the *Academy of Arcadi* was established at Rome, for reviving the study of poetry and of the belles lettres. Besides most of the politer wits of both sexes in Italy, this academy comprehends many princes, cardinals, and other ecclesiastics; and to avoid disputes about pre-eminence, all appear masked after the manner of Arcadian shepherds. Within ten years from its first establishment, the number of academists amounted to six hundred. They hold assemblies seven times a-year in a mead or grove, or in the gardens of some nobleman of distinction. Six of these meetings are employed in the recitation of poems and verses of the Arcadi residing at Rome, who read their own compositions; except ladies and cardinals, who are allowed to employ others. The seventh meeting is set apart for the compositions of foreign or absent members. This academy is governed by a Custos, who represents the whole society, and is chosen every four years, with a power of electing twelve others yearly for his assistance. Under these are two sub-custodes, one vicar or pro-custos, and four deputies or superintendants, annually chosen. The laws of the society

are immutable, and bear a near resemblance to the ancient model

X *Academies of Languages*, called, by some, *Grammatical Academies*, as,

The *Academy della Crusca* at Florence, famous for its vocabulary of the Italian tongue, was formed in 1582, but scarce heard of before the year 1581, when it became noted for a dispute between Tasso and several of its members Many authors confound this with the Florentine academy The discourses which Torricelli, the celebrated disciple of Galileo, deliver'd in the assemblies, concerning levity, the wind, the power of percussion, mathematics and military architecture, are a proof that the academists applied themselves to things [illegible] words

[illegible] *Academy of [illegible]* had its rise in [illegible], in an assembly of several princes and [illegible] of the country who met with a design [illegible] and perfect the German tongue It [illegible] long under the direction of princes of the empire, who were always chosen presidents In 1668 the number of members arose to upwards of nine hundred It was prior in time to the French academy, which only appeared in 1629 and was not established into an academy before the year 1635 It history [illegible] German tongue, by George [illegible]

The [illegible] which had its [illegible] of [illegible] of letters in [illegible] M Conrart, in 1629 In 1635 [illegible] into an academy by Cardinal Richelieu for refining and ascertaining the French language and style —The number of its members was limited to forty, out of whom a director chancellor, and secretary were to be chosen the two former held their post for two months the latter perpetual The members of this academy enjoyed several privileges and immunities among which was that of not being obliged to answer before any court but that of the king's household They met three times a week in the Louvre at breaking up forty silver medals were distributed among them, having on one side the King of France's head and on the reverse *Protecteur de l'Academie*, with laurel, and this motto *A l'Immortalité* By this distribution, the attendance of the Academists was secured, those who were present receiving the surplus otherwise intended for the absent To elect or expel a member at least eighteen were required, nor could any be chosen unless he petitioned for it By this expedient the affront of refusals from persons elected was avoided Religious were not admitted nor could any nobleman or person of distinction be admitted on another footing than as a man of letters None have been expelled except for base and dishonest practices, and there are but two instances of such expulsions the first of M Granier for refusing to return a deposit, the other of the Abbé Furetiere for plagiarism —The design of this academy was to give not only rules, but examples, of good writing They began with making speeches on subjects taken at pleasure, about twenty of which were printed They met with great opposition from the parliament at their first institution it being two years before the patents granted by the king would be registered They have been severely satyrised, and their style has been ridiculed as enervating instead of refining the French language They are also charged with having surfeited the world by flattery, and having exhausted all the topics of panegyric in praise of their founder, it having been a duty incumbent on every member at his admission, to make a speech in praise of the king, the cardinal the chancellor Seguier, and the person in whose place he was elected The most remarkable work of this academy is a dictionary of the French tongue, which, after fifty years spent in settling the words and phrases to be used in writing, was at last published in 1694

The *Royal Spanish Academy* at Madrid held its first meeting in July 1713, in the palace of its founder, the Duke d'Escalona It consisted at first of eight academists, including the duke, to which number fourteen others were afterward added, the founder being chosen president or director In 1714 the king granted them his confirmation and protection Their device is a crucible in the middle of the fire with this motto *Limpia, fija y da splendor*—"It purifies fixes, and gives brightness The number of members is limited to twenty four, the duke of Escalona to be director for life but his successors chosen yearly and the secretary to be perpetual The object, as marked out by the royal declaration, was to cultivate and improve the national language they were to begin with choosing carefully such words and phrases as have been used by the best Spanish writers, noting the low, barbarous or obsolete ones, and composing a dictionary wherein these may be distinguished from the former

ACADEMY is also used among us for a kind of collegiate school or seminary where youth are instructed in the liberal arts and sciences in a private way, now used as a name for all kind of school Frederic I king of Prussia, established an academy at Berlin in 1703, for educating the young nobility of the court, suitable to their extraction The expence of the students was very moderate, the king having undertaken to pay the extraordinaries This illustrious school, which was then called the academy of princes, has now lost much of its first splendour The Romans had a kind of military academies established in all the cities of Italy under the name of *Campi Martis* Here the youth were admitted to be trained for war at the public expence And the Greeks, besides academies of this kind, had military professors, called *tactici*,

who taught all the higher offices of war, &c We have two royal academies of this kind in England, the expences of which are defrayed by the government, the one at Woolwich for the artillery and military engineers, and the other at Portsmouth, for the navy The former was established by his late majesty king George II by warrants dated April the 30th and November 18th, 1741, for instructing persons belonging to the military part of the ordnance, in the several branches of mathematics, fortification, &c proper to qualify them for the service of artillery, and the office of engineers This institution is under the direction of the master-general and board of ordnance for the time being and at first the lectures of the masters in the academy were attended by the practitioner engineers, with the officers, serjeants, corporals, and private men of the artillery, besides the cadets At present, however, none are educated there but the gentlemen cadets to the number of about two hundred though it is probable a greater number of cadets will soon be received into the institution at one time The masters have been gradually increased, from two or three at first, now to the number of about twenty, namely, a professor of mathematics, and eight other mathematical masters, a professor of fortification, and two masters, five drawing-masters, with masters for French, chemistry, fencing, and dancing The master-general of the ordnance is always captain of the cadet company, and governor of the academy under him are a lieutenant governor, an inspector, and an inspector of studies, besides the masters This institution is of the greatest consequence to the state, though managed at a comparatively trifling expence As the former situation for the academy and cadets' barracks, in the Warren, was low, confined, and unhealthy, it was determined to erect them on a more extended and noble scale, in an elevated and healthy situation, by the side of Shooter's hill The first stone of the new buildings was laid on Friday, May 27th, 1803, by his royal highness the duke of York and the academy was removed to them on the 12th of August, 1806 The Royal Naval Academy at Portsmouth was founded by George I in 1722, for instructing young gentlemen in navigation and the subsidiary branches, to fit them for offices in the royal navy The establishment, which is now undergoing some new arrangements, is under the direction of the board of admiralty, who give salaries to various masters, by one of whom the students are at present boarded and lodged; the expence of which is defrayed by their own friends, nothing being supplied by the government but their education

ACADIE, or ACADIA, a name formerly given to Nova Scotia.

ACÆNA, in antiquity, a Grecian decempod, or ten feet rod, used in measuring their lands

ACÆNA In botany, a genus of the Linnæan class tetrandria, order monogynia, thus generically characterised calyx, four-leaved, corol, four-petalled, berry dry, inferior, single-seeded, prickly backwards The only known species is A elongata, of Mexico, a plant of about two feet high

ACAJOU In Tournefort's system, the cashew-nut See ANACARDIUM

ACALYPHA In botany, a genus of the Linnean class and order monoecia monadelphia The generic character of the male blossom is, calyx three or four leaved, corol, none, stamens from eight to sixteen The character of the female, calyx three leaved, corol none, styles three, capsules three-grained; seeds solitary There are fourteen species of this plant, collected in the East and West Indies, some of which resemble the broad-leaved pellitory of the wall but few of them have much pretension to beauty or elegance

ACALEPTIC In ancient prosody, a complete verse

ACAMANTIS In geography, the ancient name of the island of Cyprus

ACAMAS, son of Theseus and Phædra, went with Diomedes to demand Helen from the Trojans after her elopement from Menelaus He was concerned in the Trojan war, and afterwards built the town of Acamantium in Phrygia, and called a tribe after his own name at Athens

ACANACEOUS PLANTS (from ακανθαξα, thorn or prickle) Plants surrounded either in their stems or calyxes with thorns or prickles

ACANGIS, (*ravagers*) Turkish hussars, or light troops

ACANOR A kind of chemical furnace See ATHANOR

ACANTHA, (from ακανθα, a *thorn*, or *prickle*) 1 The thorn, or prickle, of plants 2 The spines of certain fishes, as of the equinus marinus

ACANTHACEOUS (from *acantha*) A term given to plants which, like the thistle, are beset with prickles Acanaceous.

ACANTHÆ (ακανθαι, a thorn or prickle) The prickles of thorny plants

ACANTHAS, a town of Egypt, now *Bisalta*

ACANTHIA In the entomology of Fabricius, a tribe or family of the genus cimex or bug See CIMEX

ACANTHINE Any thing resembling the herb acanthus Acanthine garments, among the ancients, are said to be made of the down of thistles

ACANTHINUM (ακανθινον, from ακανθα, *a thorn*) Gum arabic which is largely collected from different species of acacias and acanthuses, both of them thorn trees

ACANTHOPTERYGIOUS, (from ακανθα, a *thorn*, or *prickle*, and πτερυγιον, a *fin*, or *feather*,) A term applied to fishes, and em-

bracing a class or family distinguished by having the rays of their fins bony, or prickly, at the extremities.

ACANTHUS (*acanthus*, ακανθος, from ακανθα, a thorn.) So named from its rough and prickly surface. *Branca ursina*, or bear's breech: a genus of the Linnéan class and order didynamia, angiospermia; thus characterised: calyx two leaved, bifid or cloven; corol one lipped, deflected, three cleft; capsule two celled. There are fourteen species of this genus, in Asia, the Cape of Good Hope, and on the southern shores of Europe. The leaves and root of the *acanthus mollis foliis sinuatis inermibus* of Linnéus abound with a mucilage, which is readily extracted by boiling or infusion. The roots are most mucilaginous. Where this plant is common it is employed for the same purposes to which althæa and other vegetables possessing similar qualities are applied among us. It is fallen into disuse.

ACANTHUS, in architecture, an ornament representing the leaves of the acanthus, used in the capitals of the corinthian and composite orders.

ACANTHUS MOLLIS. The systematic name for the *acanthus*. See ACANTHUS.

ACAPULCO, a town of Mexico, in North America, situated on a fine bay of the South sea. When the galleons arrive at this place, traders flock from every part of Mexico, who come to exchange European toys, their own cochineal, and about 437,000*l* sterling for spices, muslins, printed linens, silks, perfumes, and the gold works of Asia. Lat. 17. 30 N. Lon. 105. 29 W.

ACARNA. A genus of thistles in the Linnæan system, arranged in the class and order syngenesia æqualis; and thus characterised: receptacle chaffy, down feathery, calyx imbricate, invested with scales, corol floscular. There are seven species, many of which, from their general resemblance to the *carduus benedictus*, or blessed thistle, have been improperly confounded with it. It is a native of Spain and the Barbary coasts; and has been also found in Japan.

ACARUS, TICK. In zoology, a genus of the Linnean class insectæ, order aptera; mouth without proboscis; the sucker with a cylindrical bivalved sheath, feelers two, compressed, and as long as the sucker; eyes two, placed on the sides of the head; legs eight. Its species and varieties are very numerous, and include all those which in our own language are denominated *tick* or *mite*: the itch insect is one of its species.

ACASTUS, son of Pelias, king of Thessaly, married Astydamia or Hyppolyte, who fell in love with Peleus, son of Æacus, when in banishment at her husband's court. Peleus rejecting the addresses of Hyppolyte, was accused before Acastus of attempts upon her virtue, and soon after, at a chace, exposed to wild beasts. Vulcan, by order of Jupiter, delivered Peleus, who returned to Thessaly, and put to death Acastus and his wife.

ACATALECTIC, ACATALECTICUS, in the ancient poetry, a term applicable to such verses as have all their feet and syllables, and are in no wise lame or defective at the end. The word comes from κατα, and ληγω, *to cease or end*, whence καταληκτικος, *which wants something at the end*.

ACATALEPSIA, ACATALEPSY, in philosophy, an impossibility of a thing's being conceived or comprehended. The word is compounded, of the private α, and καταλαμβανω, *deprehendo, to find out*.

ACATAPOSIS (ακαταποσις, from α, neg. and καταπινω, to swallow.) Difficulty of deglutition. Dysphagia.

ACATHARSIA (ακαθαρσια, from α, neg. and καθαιρω, to purge.) The gross and impure humours that remain uncarried off in the body.

ACATHISTUS, a solemn hymn anciently sung in the Greek church on the Saturday of the fifth week of Lent, in honour of the Virgin.

ACATIUM, in the ancient navigation, a kind of privateer, or private sloop, wrought with oars.

ACAULIS (from α, neg. and καυλος, a stalk.) A botanic term applied to herbs that have no stem, and rest their corols on the ground. Stalkless, stemless.

ACAULOSE, ACAULOUS (*acaulosus*, from α, neg. and καυλο, a caulis or stem.) A term descriptive of plants that possess no stem.

ACCA LAURENTIA, the wife of Faustulus, shepherd of king Numitor's flocks. She brought up Romulus and Remus, who had been exposed on the banks of the Tiber. From her wantonness, she was called Lupa (a prostitute, whence the fable that Romulus was suckled by a she wolf). *Dionys. Hal. Liv.*—Another prostitute, in honour of whom certain annual festivals, called *Laurentalia*, were celebrated by the Romans.

ACCAPITARE, in law, the act of becoming vassal of a lord, or of yielding him homage and obedience. Hence,

ACCAPITUM, signifies the money paid by a vassal upon his admission to a feud. It likewise, in our ancient law, was used to express the relief due to the chief lord. See RELIEF.

ACCEDAS AD CURIAM, in the English law, a writ lying, where a man has received, or fears, false judgment in an inferior court. It lies also for justice delayed, and is a species of the writ *Recordare*.

To ACCEDE. *v. n.* (*accedo*, Lat.) To be added to; to come to.

ACCELERANDO, in music, an Italian

term for accelerating the time in the middle of a piece of music, as *ralentando* is for retarding it.

To ACCELERATE, *v. a.* (*accelero*, Lat.) To make quick, to hasten, to quicken motion. (*Bacon*.)

ACCELERATION, *s.* (*acceleratio*, Lat.) 1. The act of quickening motion. 2. The state of the body accelerated. (*Hale*.)

ACCELERATION, in mechanics, the increase of velocity in a moving body. Accelerated motion is that which continually receives fresh accessions of velocity, and is either equally or unequally accelerated. Acceleration stands directly opposed to retardation, which denotes a diminution of velocity.

ACCELERATION is chiefly used in physics, in respect of falling bodies, i. e. of heavy bodies tending towards the centre of the earth by the force of gravity. That natural bodies are accelerated in their descent, is evident from various considerations, both *a priori*, and *posteriori*.—Thus we actually find that the greater height a body falls from, the greater impression it makes, and the more vehemently does it strike the subject plane, or other obstacle. Various are the systems and opinions which philosophers have produced to account for this acceleration. But as most of them are merely visionary, or hypothetical, we think it needless to describe them: Especially, since if the reader will only admit the existence of such a force as gravity, so evidently inherent in all bodies, without regard to what may be the cause of it, the whole mystery of acceleration will be cleared up. Consider gravity then, with Galileo, only as a cause or force which acts continually on heavy bodies, and it will be easy to conceive that the principle of gravitation, which determines bodies to descend, must by a necessary consequence accelerate them in falling. A body having once begun to descend, through the impulse of gravity, the state of descending is now, by Newton's first law of nature, become as it were natural to it; insomuch that were it left to itself, it would for ever continue to descend, even though the first cause of its descent should cease. But besides this determination to descend, impressed upon it by the first cause of motion, which would be sufficient to continue to infinity the degree of motion already begun, new impulses are continually superadded by the same cause, which continues to act upon the body already in motion, in the same manner as if it had remained at rest. There being then two causes of motion, acting both in the same direction, it necessarily follows, that the motion which they unitedly produce must be more considerable than what either could produce separately. And as long as the velocity is thus continued, the same cause still subsisting to increase it more, the descent must of necessity be continually accelerated. Supposing then that gravity, from whatever principle it arises, acts uniformly upon all bodies at the same distance from the centre of the earth; dividing the time which the heavy body takes up in falling to the earth, into indefinitely small equal parts, gravity will impel the body toward the centre of the earth, in the first indefinitely short instant of the descent. If after this we suppose the action of gravity to cease, the body will continue perpetually to advance uniformly toward the earth's centre, with an indefinitely small velocity, equal to that which resulted from the first impulse. But, if we suppose that the action of gravity still continues the same after the first impulse, in the second instant, or small part of time, the body will receive a new impulse toward the earth, equal to that which it received in the first instant, and consequently its velocity will be doubled; in the third instant it will be tripled; in the fourth quadrupled; in the fifth quintupled; and so on continually: for the impulse made in any preceding instant, is no ways altered by that which is made in the following one; but they are, on the contrary, always accumulated on each other. So that the instants of time being supposed indefinitely small, and all equal, the velocity acquired by the falling body, will be at every moment proportional to the times from the beginning of the descent; and consequently the velocity will be proportional to the time in which it is produced. So that if a body by this constant force acquire a velocity of $32\frac{1}{8}$ feet suppose in one second of time; it will acquire a velocity of $64\frac{1}{4}$ feet in two seconds, $96\frac{1}{2}$ feet in three seconds, $128\frac{1}{2}$ in four seconds, and so on. Nor ought it to seem strange that all bodies, small or large, acquire by the force of gravity the same velocity in the same time. For every equal particle of matter being endued with an equal impelling force, namely its gravity or weight, the sum of all the forces, in any compound mass of matter, will be proportional to the sum of all the weights, or quantities of matter to be moved; consequently the forces and masses moved being thus constantly increased, in the same proportion, the velocities generated will be the same in all bodies, great or small. That is, a double force moves a double mass of matter, with the same velocity that the single force moves the single mass; and so on. Or otherwise, the whole compound mass falls all together with the same velocity, and in the same manner, as if its particles were not united, but as if each fell by itself, separated all from one another. And thus all being let go at once, they would fall together, just as if they were united into one mass. The foregoing law of the descent of falling bodies, namely that the velocities are always proportional to the times of descent, as well as the laws concerning the spaces passed over, &c. were first discovered and taught by

the great Galileo in his Mechanical Dialogues, the general inferences established relative to uniformly accelerated motions being as below 1st That the velocities acquired, are constantly proportional to the times, in a double time a double velocity, &c 2d That the spaces described in the whole times, each counted from the commencement of the motion, are proportional to the squares of the times, or to the squares of the velocities, that is, in twice the time, the body will describe four times the space, in thrice the time, it will describe nine times the space, in quadruple the time, sixteen times the space, and so on In short, if the times are porportional to the numbers - - 1, 2, 3, 4, 5, &c, the spaces will be as 1, 4, 9, 16, 25, &c, which are the squares of the former So that if a body by the natural force of gravity, fall through the space of $16\frac{1}{12}$ feet in the first second of time, then in the first two seconds of time it will fall through four times as much, or $64\frac{1}{3}$ feet, in the first three seconds it will fall nine times as much or $144\frac{3}{4}$ feet, and so on And as the spaces fallen through are as the squares of the times, or of the velocities, therefore the times, or the velocities are proportional to the square roots of the spaces 3d The spaces described by falling bodies in a series of equal instants or intervals of time, will be as the odd numbers - - 1, 3, 5, 7, 9, &c which are the differences of the squares or whole spaces - 1, 4, 9, 16, 25, &c that is the body which has run through $16\frac{1}{12}$ feet in the first second, will in the next second run through $48\frac{1}{4}$ feet, in the third second $80\frac{5}{12}$, and so on 4th If the body fall through any space in any time it acquires a velocity equal to double that space, that is, in an equal time with the last velocity acquired if uniformly continued, it would pass over just double the space So if a body fall through $16\frac{1}{12}$ feet in the first second of time then it has acquired a velocity of $32\frac{1}{6}$ feet in a second, that is if the body move uniformly for one second with the velocity acquired it will pass over $32\frac{1}{6}$ feet in this one second and if in any time the body fall through 100 feet, then in another equal time, if it move uniformly with the velocity last acquired, it will pass over 200 feet, and so on (*Hutton's Dict* See also *Gregory's Mechanics*, vol 1 and *Hauy's Natural Philosophy*, vol 1)—The following theorems for practice, are derived from the general doctrine of acceleration Let g represent the velocity acquired by a body at the end of a second or unit of time by means of the accelerating force t the time or the number of seconds in which the body passes over any space s, and v the velocity acquired at the end of that time then we have $v = g\,t$, and $s = \frac{1}{2}\,g\,t^2$, from which two equations result the following

$$t = \frac{v}{g} \quad \frac{2s}{v} = \sqrt{\frac{2s}{g}}$$

$$= g\,t \quad \sqrt{2gs} = \frac{2s}{t}$$

$$= \tfrac{1}{2}gt^2 = \frac{vv}{2g} \quad \frac{tv}{2}$$

$$\frac{vv}{2s}$$

And here, when the constant force is the natural force of gravity, then the distance $\frac{1}{2}g$ descended in the first second, in the latitude of London, is $16\frac{1}{12}$ feet but if it be any other constant force, the value of g will be different, in proportion as the force is more or less (See FORCE) The motion of an ascending body or of one that is impelled upwards, is diminished or retarded by the same principle of gravity, acting in a contrary direction Such a body ascends until it has lost all its motion, which it does in the same space of time, that the body would have taken up in acquiring, by falling a velocity equal to that with which the falling body began to be projected upwards And consequently the heights to which bodies ascend when projected upwards with different velocities, are to each other as the squares of those velocities

ACCELERATION OF BODIES ON INCLINED PLANES The same general laws obtain here, as in bodies falling freely or perpendicularly, namely that the velocities are as the times, and the spaces descended down the planes, as the squares of the times, or of the velocities But those velocities are less, according to the sine of the plane's inclination, and the spaces less according to the square of the sine See INCLINED PLANE

ACCELERATING FORCE, in physics, is the force that accelerates the motion or velocity of bodies, and it is equal to or expressed by, the quotient arising from the motive or absolute force, divided by the mass or weight of the body that is moved In physical considerations respecting forces, velocities, times, and spaces gone over, the first inquiry is the accelerating or accelerative force This force is greater or less in proportion to the velocity it generates in the same time, and by this velocity it is measured All accelerating forces are equal, and generate equal velocities, that have the motive forces directly proportional to the quantities of matter so a double motive force will move a double quantity of matter with the same velocity, as also a triple motive force a triple quantity a quadruple force a quadruple quantity, &c all with the same velocity And this is the reason why all bodies fall equally swift by the force of gravity, for the motive force is exactly proportional to their weight or mass In general the accelerating force is in the direct ratio of the motive force, and inverse ratio of the quantity of matter —In the cases

of variably accelerated motions, the formulæ laid down in a preceding article will require some modification here we are to consider the relations of the fluxions of the time, velocity, &c Consequently taking the fluents of those expressions, in particular cases, the relations of time, space, velocity, &c are obtained

Now if t denote the time in motion,

v the velocity generated by any force,

s the space passed over,

and g the variable force at any part of the motion, or the velocity the force would generate in one second of time, if it should continue invariable, like the force of gravity, during that one second, and therefore the value of this velocity g, will be in proportion to $32\frac{1}{6}$ feet, as that variable force, is to 1 the force of gravity Then because the force may be supposed constant during the indefinitely small time t, and that in uniform motions the spaces and velocities are proportional to the times, we from thence obtain these two general fundamental proportions,

$$v \quad s \quad 1'' \quad t, \text{ or } s = tv,$$
$$g \quad v \quad 1 \quad t, \text{ or } v = gt$$

From which are derived the four formulas below, in which the value of each quantity is expressed in terms of the rest

1 - - $t =$

2. - - $v = g t$ $\quad v$

3 - - $s = v t = \dfrac{v v}{g}$

4 - - g $\quad 2 v$

And these theorems equally hold good for the destruction of motion and velocity, by means of retarding forces, as for the generation of the same by means of accelerating forces

Acceleration, in astronomy, is often used for the time whereby a fixed star in one diurnal revolution of the earth, appears to anticipate the mean motion of the sun This apparent acceleration of the stars, arises from the retardation of the sun, owing to his apparent motion in his orbit towards the east, which is about 59′ 8 $\frac{1}{3}$ of a degree every day, and this is passed over in about 3′ 55 $\frac{9}{10}$ of mean time that is, a fixed star rises, or sets, or passes the meridian, about 3 56″ sooner each day than it did on the preceding one This acceleration is, in fact, equal to the difference between the measures of a mean solar day, and a sidereal day

Acceleration of a Planet A planet is said to be accelerated in its motion, when its real diurnal motion exceeds its mean diurnal motion. And, on the other hand, the planet is said to be retarded in its motion, when the mean exceeds the real diurnal motion This inequality arises from the change in the distance of the planet from the sun, which is continually varying, the planet moving always quicker in its orbit when nearer the sun, and slower when farther off

Acceleration of the Moon, a term used to express the increase of the moon's mean motion from the sun, compared with the diurnal motion of the earth, so that it is now a little swifter than it was formerly Dr. Halley was the first who made this discovery, and he was led to it by comparing the ancient eclipses observed at Babylon with those observed by Albatennius in the ninth century, and some of his own time.—The moon s mean motion is deduced from a comparison of distant observations The time between them, being divided by the number of intervening revolutions, gives the average time of one revolution, or the mean lunar period When the ancient Chaldean observations are compared with those of Hipparchus, we obtain a certain period, when those of Hipparchus are compared with some in the ninth century, we obtain a period somewhat shorter, when the last are compared with those of Tycho Brahe, we obtain one still shorter, and when Brahe's are compared with those of our day, we obtain the shortest period of all—and thus the moon s mean motion appears to accelerate continually, and the accelerations appear to be in the duplicate ratio of the times The acceleration for the century which ended in 1700 is about nine seconds of a degree, that is to say, the whole motion of the moon during the 17th century must be increased nine seconds, in order to obtain its motion during the 18th, and as much must be taken from it, or added to the computed longitude, to obtain its motion during the 16th, and the double of this must be taken from the motion during the 16th, to obtain its motion during the 15th, &c Many conjectures have been offered as to the cause of this acceleration, and it was often looked upon as a stumbling block in the way of the Newtonian philosophy, until at length M Laplace has happily succeeded in deducing it from the Newtonian law of planetary deflection. As this is a subject of considerable importance, we shall enter a little into M. Laplace's explanation —The lunar period which we observe, is not that which would have obtained, had the moon been influenced by the earth alone We should not have known that her natural period was increased, had the disturbing influence of the sun remained unchanged, but this varies in the inverse triplicate ratio of the earth s distance from the sun, and is therefore greater in our winter, when the earth is nearer to the sun This is the source of the annual equation, by which the

lunar period in January is made to exceed that in July nearly 24 minutes The angular velocity of the moon is diminished in general $\frac{1}{179}$, and this numerical coefficient varies in the inverse ratio of the cube of the earth's distance from the sun If we expand this inverse cube of the earth's distance into a series arranged according to the sines and cosines of the earth's mean motion, making the earth's mean distance unity, we shall find that the series contains a term equal to $\frac{3}{2}$ of the square of the eccentricity of the earth's orbit Therefore the expression of the diminution of the moon's angular velocity contains a term equal to $\frac{1}{179}$ of this velocity, multiplied by $\frac{3}{2}$ of the square of the earth's eccentricity, or equal to the product of the square of the eccentricity, multiplied by the moon's angular velocity, and divided by 119 33 ($\frac{2}{3}$ of 179) Did this eccentricity remain constant, this product would also be constant, and would still be confounded with the general diminution, making a constant part of it but the eccentricity of the earth's orbit is known to diminish, and its diminution is the result of the universality of the Newtonian law of the planetary deflections Although this diminution is exceedingly small, its effect on the lunar motion becomes sensible by accumulation in the course of ages The eccentricity diminishing, the diminution of the moon's angular motion must also diminish that is the angular motion must increase —During the eighteenth century, the square of the earth's eccentricity has diminished 0 0000015325, the mean distance from the sun being = 1 This has increased the angular motion of the moon in that time, 0 000000012835 As this augmentation is gradual we must multiply the angular motion during the century by the half of this quantity, in order to obtain its accumulated effect This will be found to be 9 very nearly which exceeds that deduced from a most careful comparison of the motion of the last two centuries, only by a fraction of a second! While the diminution of the square of the eccentricity of the earth's orbit can be supposed proportional to the time, this effect will be as the squares of the times When this theory is compared with observations, the coincidence is wonderful indeed The effect on the moon's motion is periodical, as the change of the solar eccentricity is, and its period includes millions of years Its effect on the moon's longitude will amount to several degrees before the secular acceleration change to a retardation (*Encyclo Britan*)

ACCELERATOR URINÆ (*accelerator, sc musculus*, from *accelero*, to hasten) *Ejaculator seminis Bulbo-cavernosus* of Winslow A muscle of the penis It arises fleshy from the sphincter ani and membranous part of the urethra, and tendinous from the crus, nearly as far forwards as the beginning of the corpus cavernosum penis, the inferior fibres run more transversely, and the superior descend in an oblique direction It is inserted into a line in the middle of the bulbous part of the urethra, where each joins with its fellow, by which the bulb is completely closed The use of this pair of muscles is to drive the urine or semen forward, and by grasping the bulbous part of the urethra, to push the blood towards its corpus cavernosum, and the glands by which they are distended

To ACCEND, *v a* (*accendo*, Lat) To kindle, to set on fire (*Decay of Piety*)

ACCENDENTES, a lower order of ministers in the Romish church, whose office is to light and trim the candles

ACCENDONES, or ACCEDONES, in Roman antiquity, a kind of officers in the gladiatorian schools, who excited and animated the combatants during the fight

ACCENSI, in Roman antiquity, was applied to three descriptions of persons 1 To certain supernumerary soldiers, designed to supply the places of those who should be disabled or killed 2 To a kind of adjutants appointed by the tribune to assist each centurian and decurion 3 To an inferior order of officers, appointed to attend the Roman magistrates, somewhat in the manner of ushers or tipstaves among us

ACCENSION, *s* The act of kindling, or setting a body on fire Thus the accension of tinder is effected by striking fire with flint and steel

ACCENT, *s* (*accentus*, Lat) 1 The manner of speaking or pronouncing 2 The sound of a syllable (*Shaksp*) 3 The marks made upon syllables to regulate their pronunciation (*Holder*) 4 A modification of the voice, expressive of the passions or sentiments (*Prior*)

ACCENT in its primitive sense an affection of the voice which gives each syllable of a word its due pitch in respect of height or lowness The word is originally Latin, *accentus* a compound of *ad*, to, and *cano*, to sing In this sense, accent is synonymous with the Greek τονος the Latin *tenor*, or *tonor*, and the Hebrew טעם *gustus*, taste The accent, properly, only respects high and low or acute and grave Though the modern grammarians use it also in respect of loud and soft, long and short, but this confounds Accent with Quantity

ACCENT is also used in grammar, for a character placed over a syllable to mark the accent, i e to shew it is to be pronounced in a higher, or in a lower tone, and to regulate the inflexions of the voice in reading It is distinguished from emphasis, as the former regard the tone of the voice, the latter the strength of it We reckon three grammatical accents in ordinary use, all borrowed from the Greeks, viz the *acute accent*, which shews when the tone of the voice is to be raised In modern writings it is a little line, or virgula,

placed over the vowel, a little sloping or inclined, in its descent, from right to left, as ` It is not ordinarily used, either in English or Latin: the French, indeed, retain it, but it is only to mark the close or masculine é.—The *grave accent*, when the note or tone of the voice is to be depressed, and is figured thus `—The *circumflex accent*, which is composed of both the acute and the grave; it points out a kind of undulation of the voice, and is expressed thus ^ or ˆ. But if it be true that the whole system of pronunciation turns on three accents, it is no less true, that each of these three admits of several degrees. The acute accent for instance may be either higher or lower, may be simply acute, or very acute; and the like holds of the grave and circumflex. So that each of the three common accents is, as it were, a genus, including divers particular species, though the ancient grammarians have not thought fit to give particular names and figures to all these differences. The Hebrews have a grammatical, a rhetorical, and a musical accent, though the first and last seem, in effect, to be the same, both being comprised under the general name of tonic accents, because they give the proper tone to syllables; and the rhetorical accents are said to be euphonic, inasmuch as they tend to make the pronunciation more sweet and agreeable. There are four euphonic accents and twenty-five tonic; however, authors are not agreed as to the number, of which some are placed above, and others below the syllable; the Hebrew accents serving not only to regulate the risings and fallings of the voice, but also to distinguish the sections, periods, and members of periods, in a discourse, and to answer the same purpose with the points in other languages. Their accents are divided into emperors, kings, dukes, &c. each bearing a title answerable to the importance of the distinction it makes. Their emperor rules over a whole phrase, and terminates the sense completely, answering to our point. Their king answers to our colon, and their duke to our comma. The king, however, occasionally becomes a duke, and the duke a king, as the phrases are more or less short. The Hebrew accents, in effect, have something common with those of the Greeks and Latins, and something peculiar to themselves. What they have in common, is that they mark the tone, shewing how the voice is to be raised, and sunk, on certain syllables. What they have peculiar is, that they do the office of the points in other languages. It is certain that the ancient Hebrews were not acquainted with these accents: their origin and use therefore have been much controverted. And there has been full as much dispute concerning the antiquity, &c. of the Greek accents as on those of the Hebrew. The use of accents to prevent ambiguities is most remarkably perceived in some eastern languages, particularly the Siamese and Chinese. Among the people of China, every word, or (which is the same thing) syllable, admits of five accents, as spoken more acutely or remissly, and thus stands for many different things. The same sound *ya*, according to the accent affixed to it, signifies God, a wall, excellent, stupidity, and a goose. The Chinese have but 330 spoken words in their language, but these being multiplied by the different accents or tones which affect the vowels, furnish a language tolerably copious. By means hereof, their 330 simple sounds come to denote 1650 things; but this being hardly sufficient, they are increased further by aspirates added to each word to double the number. The Chinese only reckon four accents, for which the missionaries use the following marks, *uâ, u, à, a*, to which they have added a fifth, thus *ã*. Among the English it is found that emphasis, in particular cases, alters the seat of the accent. This is demonstrable from the following examples: "He shall *increase*, but I shall *decrease*." "There is a difference between giving and *forgiving*." "In this species of composition, *plausibility* is much more essential than *probability*." In these examples, the emphasis requires the accent to be placed on syllables to which it does not commonly belong.

*Accent, in music, is a modulation of the voice to express a passion. Every bar or measure is divided into accented and unaccented parts. The accented parts are the principal, being those intended chiefly to move and affect: it is on these the spirit of the music depends. Hence the harmony is in general to be full, and void of discords in the accented parts of the measure, while in the unaccented parts discords are allowed. In common time, of four crotchets in a bar, the accentuation will fall usually on the first and third crotchets of the bar; in triple time, on the first note of the bar. But these rules are often departed from, and with much success.

To Accent. *v. a.* (from *accentus*, Lat.) 1. I to speak words with particular regard to the grammatical marks or rules (*Locke*). 2. [illegible] try, to pronounce or utter in general (*Walton*). 3. To write or note the accent.

To ACCENTUATE. *v. a.* (*accentuer*, Fr.) To place the proper accents over the vowels.

ACCENTUATION. *s.* (from *accentuate*) The act of placing the accent in pronunciation.

To ACCEPT. *v. a.* (*accipio*, Lat. *accepter*, Fr.) 1. To take with pleasure, to receive kindly, to admit with approbation (*Dryden*). 2. In the language of the Bible, to accept persons, is to act with personal and partial regard.

ACCEPTABILITY. *s.* The quality of being acceptable (*Taylor*).

ACCEPTABLE. *a.* (*acceptable*, French) Grateful, pleasing.

ACCEPTABLENESS, *s* (from *acceptable*) The quality of being acceptable (*Grew*)

ACCEPTABLY, *ad* (from *acceptable*) In an acceptable manner (*Taylor*)

ACCEPTANCE, *s* (*acceptance*, Fr) Reception with approbation (*Spenser*)

ACCEPTANCE, in common law, denotes a tacit agreement to a preceding act, which might have been defeated and avoided, were it not for such acceptance had —If a man and his wife, seised of land in the right of the wife, make a joint lease, or feoffment by deed reserving rent, the man dying, and the wife receiving the rent, such receipt is deemed an acceptance, and shall make the lease good so that she shall be barred from bringing the writ, Cui in vita

ACCEPTANCE, in commerce is the subscribing, signing, and making one's self debtor for the sum contained in a bill of exchange, or other obligation If there be a right understanding between both parties, a small matter amounts to an acceptance, as "Leave your bill with me, and I will accept it or, call for it to morrow and it shall be accepted This obliges as effectually by the custom of the merchants and of law, as if the party had actually signed the bill But should a man say Leave your bill with me and I will look over my account between the drawer and me and call to morrow, and I will accept the bill accordingly, this shall not amount to a complete acceptance for this mention of the account, was really intended to give him an opportunity of examining if there were effects in his hands to answer, without which perhaps he would not accept the same so it was ruled by Lord Chief Justice Hale

ACCEPTATION, *s* (from *accept*) 1 Reception whether good or bad (*Sidney*) 2 Good reception, acceptance (*Raleigh*) 3 The state of being acceptable, regard 4 Acceptance in the juridical sense (*South*) 5 The meaning of a word, as it is commonly received (*Bentley*)

ACCEPTER or ACCEPTOR, *s* (from *accept*) The person that accepts

ACCEPTILATION, *s* (*acceptilatio* Lat) The remission of a debt by an acquittance from the creditor testifying the receipt of money which has never been paid

ACCEPTION, *s* (*acception*, Fr from *acceptio* Lat) The received sense of a word, the meaning not in use (*Hammond*)

ACCESS, *s* (*accessus*, Lat *accès*, Fr) 1 The way by which any thing may be approached (*Hammond*) 2 The means, or liberty of approaching either to things or men (*Milton*) 3 Increase, enlargement, addition (*Bacon*) 4 The return or fits of a distemper

ACCESSARINESS, *s* (from *accessary*) The state of being accessary

ACCESSARY, *a* (a corruption of *accessory*) That contributes to a crime without being the chief constituent of it (*Clarend*)

ACCESSIBLE, *a* (*accessibilis*, Lat *accessible*, Fr) That may be approached (*Addison*)

ACCESSION, *s* (*accessio*, Lat *accession* Fr) 1 Increase by something added, enlargement, augmentation (*Rogers*) 2 The act of coming to, or joining one's self to as accession to a confederacy 3 The act of arriving at, as the King's accession to the throne

ACCESSION, (*accessio*, *f* from *accedo*, to approach) The approach or commencement of a disease A term mostly applied to a fever which has paroxysms or exacerbations, thus the accession of fever means the commencement or approach of the pyrexial period

ACCESSORII or WILLIS (*accessorii*, sc *nervi*, from *accedo*, to approach, so called from the course they take) The name given by Willis to two nerves which ascend, one on each side from the second fourth and fifth cervical pairs of nerves through the great foramen of the occipital bone and pass out again from the cranium through the foramina lacera with the par vagum to be distributed on the trapezius muscle

ACCESSORILY *ad* (from *accessory*) In the manner of an accessory

ACCESSORY *a* Joined to another thing so as to increase it, additional (*Hooker*)

ACCESSORY, *s* (*accessorius* Lat *accessoire* Fr) Some person or thing which accedes or is added to another more considerable person or thing

ACCESSORY or ACCESSARY in common law, is chiefly used for a person guilty of a felonious offence not principally but by participation as by advice, command or concealment There are two kinds of accessories before the fact, and after it The first is he who commands or procures another to commit felony, and is not present himself, for if he be present he is a principal The second is he who receives assists or comforts any man that has done murder, or felony, whereof he has knowledge A man may also be accessory to an accessory by aiding, receiving, &c an accessory in felony An accessory in felony shall have judgment of life and member, as well as the principal, who did the felony, but not till the principal be first attainted, and convict, or outlawed thereon Where the principal is pardoned without attainder, the accessory cannot be arraigned it being a maxim in law Ubi non est principalis, non potest esse accessorius But if the principal be pardoned, or have his clergy after attainder, the accessory shall be arraigned 4 and 5 W and M c 4 And by stat 1 Anne, c 9 it is enacted that where the principal is convicted of felony or stands mute or challenges above twenty of the jury, it shall be lawful to proceed against the accessory in the same manner as if the principal had been attainted,

and notwithstanding such principal shall be admitted to his clergy, pardoned, or delivered before attainder In some cases also, if the principal cannot be taken, then the accessory may be prosecuted for a misdemeanor, and punished by fine, imprisonment, &c Stat ibid See stat 5 Anne, c 31 In the lowest and highest offences there are no accessories, but all are principals as in riots, routs, forcible entries, and other trespasses, which are the lowest offences So also in the highest offence, which is, according to our law, high treason, there are no accessories Cok Littlet 71

ACCIDENCE, *s* (a corruption of *accidents*, from *accidentia*, Lat) The little book containing the first rudiments of grammar, and explaining the properties of the eight parts of speech

ACCIDENS, ACCIDENT, in philosophy Per accidens, is frequently used among philosophers to denote what does not follow from the nature of a thing, but from some accidental quality thereof in which sense it stands opposed to per se, which denotes the nature and essence of a thing Thus, fire is said to burn per se, or considered as fire, and not per accidens, but a piece of iron, though red-hot, only burns per accidens, by a quality accidental to it, and not considered as iron

ACCIDENS, (from *accido*, to happen) A symptom in diseases

ACCIDENT, *s* (*accidens*, Lat) 1 The property or quality of any being, which may be separated from it, at least in thought (*Davies*) 2 In grammar, the property of a word (*Holder*) 3 That which happens unforeseen, casualty, chance (*Hooker*)

ACCIDENT, in heraldry, an additional point or mark in a coat of arms which may be either omitted or retained without altering the essence of the armour, such as abatement, difference, and tincture

ACCIDENTAL, *s* (*accidental*, Fr) A property nonessential (*Watts*)

ACCIDENTAL *a* (from *accident*) 1 Having the quality of an accident non-essential (*Tillotson*) 2 Casual, fortuitous, happening by chance

ACCIDENTAL COLOURS are those which depend upon the affections of the eye, in contradistinction to those which belong to the light itself The impressions made upon the eye by looking stedfastly at a particular colour are various, according to the single colour or combination of colours in the object and they continue for some time after the eye is withdrawn, and give a false colouring to other objects Mr Buffon has endeavoured to trace the connections which these accidental colours have with such as are natural, in a variety of instances The same subject has likewise been ingeniously treated by Dr Darwin

ACCIDENTAL DIGNITIES, and DEBILITIES, in astrology, certain casual dispositions of the planets, whereby they are supposed to be either strengthened, or weakened

ACCIDENTAL POINT, in perspective, is that point in the horizontal line where the projections of two lines parallel to each other meet the perspective plane

ACCIDENTALLY, *ad* (from *accidental*) 1 After an accidental manner (*Harvey*). 2 Casually, fortuitously (*Swift*)

ACCIDENTALNESS, *s* (from *accidental*) The quality of being accidental

ACCIPIENT, *s* (*accipiens*, Lat) A receiver

ACCIPITER, (from *accipio*, to take or seize) 1 The hawk, so named from its rapacity Its fat was formerly esteemed in medicine as an antidote in ophthalmias (See FALCO) 2 Accipiter means also a bandage for the nose, from the tightness of its grasp, or its hawk s-claw shape

ACCIPITRANA See HIERACIUM, and SISYMBRIUM

ACCIPITRES The first order of the Linnéan class, Birds the ordinal character being, bill somewhat hooked downwards, the upper mandible dilated near the point, or armed with a tooth, nostrils open legs short, and strong, feet formed for perching, having three toes forwards and one backwards toes warty under the joints, claws hooked and sharp pointed body muscular, flesh tough and not fit to be eaten, food, the carcases of other animals, which they seize and tear, nest in high places, eggs about four, female larger than the male they live in pairs See ZOOLOGY

ACCISMUS, denotes a feigned refusal of something which a person earnestly desires The word is Latin, or rather Greek ἀκκισμος, supposed to be formed from *Acco*, the name of a foolish old woman famous in antiquity for an affectation of this kind In rhetoric, it is used as a species of irony

To ACCITE, *v a* (*accito*, Lat) To call; to summon

ACCIUS (Lucius), a Latin tragic poet, was born according to some in the year of Rome 583 He wrote several tragedies, on subjects taken from the Grecian history, and one, entitled Brutus, from the Roman Two comedies, one named the Wedding, and the other the Merchant, are also ascribed to him His style has been accounted too harsh, but he is generally allowed to have been a great poet Besides these performances, he wrote his Annals, and several poems There was also, in the same age, an orator of the name of Accius, against whom Cicero defended Cluentius He was a native of Pisaurum

ACCLAIM, *s* (*acclamo*, Lat) A shout of praise, acclamation (*Milton*)

ACCLAMATION, a confused noise, or shout of joy, by which the public express

their applause, esteem, or approbation of any thing. Acclamation, in a more proper sense, denotes a certain formula of words, uttered with extraordinary vehemence, and in a peculiar tone, somewhat resembling a song, frequent in the ancient assemblies. Acclamations were usually accompanied with applauses, with which they are sometimes confounded, though they ought to be distinguished; as acclamation was given by the voice, applause by the hands; besides, acclamation was also bestowed on persons absent, applause only on those present. Acclamation was also given by women, whereas applause seems to have been confined to men. Acclamation, at first practised in the theatre, and passing thence to the senate, &c. was in process of time received into the acts of councils, and the ordinary assemblies of the church. The preacher, when admired, was interrupted by various expressions of approbation; as, *Orthodox! Third Apostle!* &c. These acclamations being carried to excess, and often misplaced, were at length abrogated, though they appear to have been used as low down as the time of St. Bernard.

ACCLAMATION, in rhetoric, the same as EPIPHONEMA.

ACCLAMATION MEDALS, among antiquaries, such as represent people in the posture of acclamation.

ACCLIVITY, *s.* (from *acclivus*, Lat.) The steepness or slope of a line inclining to the horizon, reckoned upward; as the ascent of a hill is the acclivity, the descent is the declivity (*Ray*).

ACCLIVOUS, *a.* (*acclivus*, Lat.) Rising with a slope.

To ACCLOY, *v. a.* (See CLOY.) 1. To fill up, in an ill sense, to crowd, to stuff full (*Spenser*). 2. To fill to satiety (*Ray*).

ACCLOYED, signifies pricked; thus, a horse's foot when pricked in shoeing, is said to be accloyed.

To ACCOIL, *v. n.* (See COIL.) To crowd, to bustle, to be in a hurry (*Spenser*).

ACCOLA, among the Romans, signified a person who lived near some place; in which sense, it differed from incola, the inhabitant of such a place.

ACCOLADE, a ceremony anciently used in the conferring of knighthood; and supposed to be the embrace, or kiss which princes anciently gave the new knight, as a token of their affection. Others will rather have it to be a blow on the chine of the neck, given on the same occasion.

ACCOLLE, sometimes synonimous with ACCOLADE. It is also used in various senses in heraldry; sometimes it is applied to two things joined; at other times, to animals with crowns, or collars about their necks, as the lion in the Ogilvy's arms; and, lastly, to maces, swords, &c. placed salterwise behind the shield.

ACCOLENT, *s.* (*accolens*, Lat.) A borderer.

ACCOMMODABLE, *a.* (*accommodabilis*, Lat.) That may be fitted (*Watts*).

To ACCOMMODATE, *v. a.* (*accommodo*, Lat.) 1. To supply with conveniencies (*Shaksp.*). 2. To adapt, to fit (*Locke*). 3. To reconcile, to adjust what seems inconsistent or at variance (*Norris*).

ACCOMMODATE, *a.* (*accommodatus*, Lat.) Suitable, fit (*Tillotson*).

ACCOMMODATELY, *ad.* Suitably, fitly.

ACCOMMODATION, *s.* (from *accommodate*). 1. Provision of conveniencies. 2. *In the plural*, conveniencies, things requisite to ease or refreshment (*Clarendon*). 3. Adaptation, fitness (*Hale*). 4. Composition of a difference, reconciliation. To know a thing by accommodation, is to know it by the idea of a similar thing referred thereto. A prophecy of Scripture is said to be fulfilled various ways, properly, as when a thing foretold comes to pass; and improperly, or by way of accommodation, when an event happens to any place or people, like to what fell out some time before to another. The primitive church accommodated multitudes of Jewish, and even heathen ceremonies and practices, to Christian purposes; but the Jews had before done the same by the Gentiles: some will even have circumcision, the tabernacle, brazen serpent, &c. to have been originally of Egyptian use, and only accommodated by Moses to the purposes of Judaism. Some modern theological, or anti-theological writers, have carried this principle of accommodation to a very great extent indeed. They have stripped the Bible of almost every thing which characterises it as a system of revealed religion, and have thus accommodated it to the views of Deists in general.

ACCOMPANABLE, *a.* (from *accompany*). Sociable: not used (*Sidney*).

ACCOMPANIER, *s.* (from *accompany*). The person that makes part of the company, a companion.

ACCOMPANIMENT, in music, those instrumental parts in a composition which do not include the principal or principals, but which are added to relieve them, to supply the necessary chasms, fill up the harmony, decorate and heighten the general effect.

ACCOMPANIMENT, in heraldry, any thing added to a shield by way of ornament, as the belt, mantling, supporters, &c.

ACCOMPANIST, or ACCOMPANIER, in music, the performer who takes the accompanying part. Rousseau has very admirably enumerated the qualifications of an accompanier. "Whoever, says he, "undertakes to accompany a song or solo, should be a consummate musician, well skilled in harmony, and the construction of the several parts; should have a nice and cultivated ear, a hand prepared for all difficulties of execution in the bass, and modulation into different keys, with a sound

judgment and good taste It is the business of the accompanier on the organ, harpsichord, or piano forte to give the pitch to the several instruments, and the time of the whole band to have always under his hand the note which the singer is about to deliver in order to correct, if false and enforce it feeble, and, at the beginning of an air or movement to mark with energy and precision the several portions of the bar that the orchestra if a quick air, may proportion the rapidity to the abilities of the singer, and whether quick or slow indicate such a specific motion as suits the genius of the composition, and the design of the composer But above all, whoever is accompanying another to whom the principal melody is assigned, should remember, that he is a servant, an humble attendant on a temporary superior, and should suppress all ambition of shining at the expence of the voice or instrument which he accompanies

To ACCOMPANY *v a* (*accompagner* Fr) To be with another as a companion (*Swift*)

To ACCOMPANY *v n* To associate with, to become companion to (*Bacon*)

ACCOMPLICE *s* (*complice*, Fr from *complex*, Lat) 1 An associate, a partaker (*Swift*) 2 A partner or co operator (*Addison*) The word is generally applicable to criminal and is synonymous with *Accessory* By the law of Scotland the accomplice can only be prosecuted after the conviction of the principal offender

To ACCOMPLISH, *v a* (*accomplir* Fr from *compleo* Lat) 1 To complete, to execute fully (*Ezekiel*) To complete a period of time (*Daniel*) 3 To fulfil, as a prophecy (*Addison*) 4 To gain to obtain (*Shaksp*) 5 To adorn, or furnish either mind or body *Shaksp*)

ACCOMPLISHED *p a* 1 Complete in some qualification (*Locke*) 2 Elegant finished in respect of embellishments (*Milton*)

ACCOMPLISHER *s* (from *accomplish*) The person that accomplishes

ACCOMPLISHMENT (*accomplissement*, Fr) 1 Completion full performance perfection (*Hayward*) Completion as of a prophecy (*Atterb*) 3 Embellishment elegance, ornament of mind or body (*Addison*) 4 The act of obtaining any thing (*South*)

ACCOMPT *s* (*compte* Fr) An account a reckoning (*Hooker*)

ACCOMPTANT, *s* (*accomptant*, Fr) A reckoner, a computer (*South*)

ACCOPUM ... A topical medicine used by the ancients both externally as ointment or charge, and internally as an electuary It is compounded of a great number of hot penetrating ingredients many of which are not now to be procured and all of which may be answered by more simple preparations

To ACCORD, *v a* (derived by some, from *chorde*, the string of a musical instrument, by others from *corda* hearts) 1 To make agree, to adjust one thing to another (*Pope*) 2 To bring to agreement (*Hale*)

To ACCORD *v n* To agree, to suit one with another (*Tillotson*)

ACCORD *s* (*accord*, Fr) 1 A compact, an agreement (*Dryden*) 2 Concurrence, union of mind (*Spenser*) 3 Harmony, symmetry (*Dryden*) 4 Own accord, voluntary motion (*Spenser*)

ACCORD in law, a verbal agreement betwe... two or more where any one is injured by a trespass or other offence committed, to make satisfaction to the injured party, who, after the accord is performed, will be barred in law from bringing any new action against the aggressor for the same trespass

ACCORD, in music (See CONCORD) The term accord is also sometimes used to describe the state of an instrument whose sounds have the proper relative proportion to each other

ACCORDANCE *s* (from *accord*) 1 Agreement with a person (*Fairfax*) 2 Conformity to something (*Hammond*)

ACCORDANT *a* (*accordant* Fr) Willing in good humour (*Shaksp*)

ACCORDING *prep* (from *accord*) 1 In a manner suitable to agreeably to, in proportion (*Hooker*) With regard to (*Holder*)

ACCORDINGLY *ad* (from *accord*) Agreeably suitably, conformably (*Shaksp*)

To ACCOST *v a* (*accoster* Fr) To speak to first to address to salute (*Milton*)

ACCOSTABLE *a* (from *accost*) Easy of access familiar not in use (*Wotton*)

ACCOUCHEUR or ACCOUCHEUSE Fr A man or woman practising midwifery

ACCOUCHEMENT, Fr The act of delivery

ACCOUNT *s* (from the old French *acompt*) 1 A computation of debts or expences (*Shaksp*) 2 The state or result of a computation 3 Value or estimation (*Hooker*) 4 Profit advantage (*Addison*) 5 Distinction dignity rank (*Pope*) 6 Regard consideration sake (*Locke*) 7 A narrative relation 8 The review or examination of an affair taken by authority (*Matt*) 9 The relation and reason of a transaction given to a person in authority (*Shaksp*) 10 Explanation, assignment of causes (*Locke*) 11 An opinion previously established (*Bacon*) 12 The reasons of any thing collected (*Addison*)

ACCOUNT is taken sometimes in a particular sense, for the computation of time, thus we say, the Julian Account the Gregorian Account &c in which sense it is equivalent to style

ACCOUNT, or ACCOUNTS is also used, collectively for the several books or registers which merchants keep of their affairs and negociations (See BOOK-KEEPING) There are divers kinds of accounts among merchants as personal, real, imaginary general, particular accounts &c

To ACCOUNT, *v. a.* (See ACCOUNT.) 1. To esteem, to think, to hold in opinion (*Deut.*) 2. To reckon, to compute (*Holder*). 3. To assign to (*Clarendon*). 4. To hold in esteem (*Chron.*)

To ACCOUNT, *v. n.* 1. To reckon (*Holder*). 2. To give an account, to assign the causes (*Swift*). 3. To make up the reckoning, to answer for practices (*Dryden*).

ACCOUNTABLE, *a.* (from *account*) Of whom an account may be required; who must answer for (*Oldham*).

ACCOUNTANT, *a.* (from *account*) Accountable to, responsible for (*Shakesp.*)

ACCOUNTANT, *s.* (See ACCOMPTANT.) A computer, a man skilled or employed in accounts (*Brown*).

ACCOUNTANT-GENERAL, an officer in the Court of Chancery who receives all monies lodged in the court, and conveys the same to the Bank of England.

ACCOUNT-BOOK, *s.* A book containing accounts (*Swift*).

To ACCOUPLE, *v. a.* (*accoupler*, Fr.) To join, to link together (*Bacon*).

To ACCOURAGE, *v. a.* To entertain with courtship, courtesy (*Spenser*).

To ACCOUTRE, *v. a.* (*accoutrer*, Fr.) To equip (*Dryden*).

ACCOUTREMENT, *s.* (*accoutrement*, Fr.) Dress, equipage, trappings, ornaments (*Spenser*).

ACCRETION, *s.* (*accretio*, Lat.) The act of growing to another, so as to increase it (*Bacon*).

ACCRETION, among civilians, the property acquired in a vacant or unoccupied thing, by adhering to or following another already occupied: thus, if a legacy be left to two persons, one of whom dies before the testator, the legacy devolves to the survivor by right of accretion.

ACCRETIVE, *a.* (from *accretion*) Growing; that which by growth is added (*Glanv.*)

To ACCROACH, *v. a.* (*accrocher*, Fr.) To draw to one as with a hook.

ACCROCHE, in heraldry, denotes a thing being hooked with another.

To ACCRUE, *v. n.* (from the participle *accru*, Fr.) 1. To accede to, to be added to. 2. To be added, as an advantage or improvement (*Spenser*). 3. In a commercial sense, to be produced, or to arise, as profits (*Addison*).

ACCUBATION (from *ad*, to, and *cubo*, I lie down). A posture of the body, between sitting and lying. Accubation, or *accubitus*, was the table posture of the Greeks and Romans. There were usually three persons on each bed, to crowd more, was esteemed sordid. In eating, they lay down on their left sides, with their heads resting on the pillows, or rather on their elbows. One lay at the head of the bed, with his feet extended behind the back of the second; another lay with the head of his neck towards the navel of the first, only separated by a pillow, his feet behind the back of the third, and so of the third or fourth. The middle place was esteemed the most honourable. It was accounted indecent for the women to accumb among men.

ACCUBITOR, anciently an officer of the emperor of Constantinople, whose business it was to lie near him.

To ACCUMB, *v. a.* (*accumbo*, Lat.) To lie at the table, according to the ancient manner.

ACCUMBENT, *a.* (*accumbens*, Lat.) Leaning (*Arbuthnot*).

To ACCUMULATE, *v. a.* (from *accumulo*, Lat.) To pile up, to heap together (*Shakesp.*)

ACCUMULATION, *s.* (from *accumulate*.) 1. The act of accumulating (*Shakesp.*) 2. The state of being accumulated (*Arbuth.*)

ACCUMULATIVE, *a.* (from *accumulate*) 1. That does accumulate. 2. That is accumulated (*Gov. of Tongue*).

ACCUMULATOR, *s.* (from *accumulate*.) He that accumulates, a gatherer or heaper together (*Decay of Piety*).

ACCURACY, *s.* (*accuratio*, Lat.) Exactness, nicety (*Delany. Arbuth.*)

ACCURATE, *a.* (*accuratus*, Lat.) 1. Exact, as opposed to negligence or ignorance. 2. Exact, without defect or failure (*Colson*). 3. Determinate, precisely fixed (*Bacon*).

ACCURATELY, *ad.* (from *accurate*) Exactly, without error, nicely (*Newton*).

ACCURATENESS, *s.* (from *accurate*) Exactness, nicety (*Newton*).

To ACCURSE, *v. a.* (See CURSE.) To doom to misery (*Hooker*).

ACCURSED, *part. a.* 1. That is cursed or doomed to misery (*Denham*). 2. Execrable, hateful, detestable (*Shakesp.*)

ACCUSABLE, *a.* (from *accuse*) That may be censured, blameable, culpable (*Brown*).

ACCUSATION, *s.* (from *accuse*). 1. The act of accusing (*Milton*). 2. The charge brought against any one (*Shakesp.*)—Nothing, according to Machiavel, tend more to the preservation of a state than frequent accusations of persons trusted with the administration of public affairs. This accordingly was strictly observed by the Romans, in the instances of Camillus accused of corruption by Manlius Capitolinus, &c. By the Roman law, there was no public accuser for public crimes; every private person, whether interested in the crime or not, might accuse, and prosecute the accused to punishment or absolution. The ancient Roman lawyers distinguished between postulatio, delatio, and accusatio: for first, leave was desired to bring a charge against one, which was called postulatio; then the person whom the charge was laid was brought before the judge, which was called delatio, or nominis delatio; lastly, the charge was drawn up and presented, which was properly the accus-

tio (*Voss Etym Lat*) The accusation properly commenced, according to Pædianus, when the reus, or party charged, being interrogated denied he was guilty of the crime, and subscribed his name to the delatio made by his opponent (*Cal Lex Jur p* 17)—By Magna Charta no Englishman shall be imprisoned or condemned on any accusation, without trial by his peers, or the law None shall be vexed upon any accusation, but according to the law of the land, and no man may be molested by petition to the king, &c unless it be by indictment, or presentment of lawful men, or by process at common law (*Stat* 25 *Ed* III *st* 5 *c* 4 28 *Ed* III *c* 3)

ACCUSATIVE, in the Latin grammar, is the fourth case of nouns, and signifies the relation of the noun on which the action implied in the verb terminates, and hence in such languages as have cases, these nouns have a particular termination called accusative as *Augustus vicit Antonium*, Augustus vanquished Antony Here *Antonium* is the noun, on which the action implied in the verb *vicit* terminates, and therefore must have the accusative termination Ovid, speaking of the palace of the sun, says, *Materiem superabat opus*, The work surpassed the material Here *materiem* has the accusative termination, because it determines the action of the verb *superabat* In the English language there are no cases, except the genitive, the relation of the noun being shewn by the assistance of prepositions, as *of, to, from, &c* By these means we are not embarrassed with the trouble and difficulties attending other languages

ACCUSATORY, *a* (from *accuse*) That produces or contains an accusation (*Ayliffe*)

To ACCUSE, *v a* (*accuso*, Lat) 1 To charge with a crime (*Dryden*) 2 To blame or censure (*Romans*)

ACCUSER, *s* (from *accuse*) He that brings a charge against another (*Ayliffe*)

To ACCUSTOM, *v a* (*accoutumer*, Fr) To habituate, to inure (*Milton*)

ACCUSTOMABLE, *a* (from *accustom*) Of long custom, habitual, customary (*Hale*)

ACCUSTOMABLY, *ad* According to custom (*Bacon*)

ACCUSTOMANCE, *s* (*accoutumance*, Fr) Custom, habit, use (*Boyle*)

ACCUSTOMARILY, *ad* In a customary manner

ACCUSTOMARY, *a* (from *accustom*) Usual, practised, according to custom

ACCUSTOMED, *a* (from *accustom*) According to custom, frequent, usual (*Shaksp*)

ACE, *s* (*as*, Lat) 1 An unit, a single point on cards or dice (*South*) 2 A small quantity (*Gov of the Tongue*)

ACE, a place of Arcadia, near Megalopolis, where Orestes was cured from the persecution of the Furies, who had a temple here

ACEPHALI, or ACEPHALITÆ, frequently occurs in ecclesiastical history, as the denomination of divers sects particularly, 1 Of those who in the affair of the council of Ephesus, refused to follow either St Cyril, or John of Antioch 2 The followers of Peter Mongus, in the fifth century 3 The adherents of Severus of Antioch

ACEPHALUS, or ACEPHALOUS, *a* Something that wants a head The word is composed of the privative α and κεφαλη, *caput*, head The levellers in the reign of Henry I were called *acephali* This word, in our ancient law-books, is also used for those poor people who had no proper lord, as holding nothing in fee, either of king, bishop, baron, or other feudal lord

ACEPHALUS, is used in poetry, to denote a verse defective at the beginning

ACER The maple A genus of the Linnéan class and order Polygamia Monœcia, thus generically characterised, calyx five-cleft, corol five-petalled, stamens eight, pistil one, capsules two or three, superior, single-seeded, terminating in an ala or wing The male genus, with eight stamens, has neither germ, nor style The entire genus comprises twenty species, of which the males are for the most part forest trees and are common to Europe and America The most frequent species in our own country is the acer pseudo platanus, great maple, sycamore tree, plane or mock-plane It is often used in turnery, as the most convenient wood for dishes, bowls, and trenchers, and before the introduction of earthen ware, was used still more generally The most beautiful species of the plant is the acer rubrum, or scarlet maple, which is often cultivated for its lovely scarlet flower The acer campestre is chiefly grown in this country for hop-poles The acer saccharinum is the most useful species where it grows indigenously, as in North America being the source of the maple-sugar, from which it derives its specific name This plant springs generally to the height of forty feet, and the saccharine juice is obtained by tapping the tree with an auger about the months of February, March, and April Two full sized trees will yield at this period, when the alburnum or sap is rising, about twenty-three gallons of juice in twenty-four hours, from which very nearly five pounds of sugar are commonly obtained, although the sap is sometimes so richly impregnated with saccharine matter as to yield a pound averdupois of sugar from every three gallons of its juice Yet even this last proportion is far less abundant than that afforded by the sugar-cane

ACERATOS, (from α neg and κεραω, to mix) Unmixed, uncorrupted

ACERB, *a* (*acerbus*, Lat) Acid, with an addition of roughness (*Quincy*) Sour, sharp, astringent, rough, properties common to many immature fruits

ACERBITY, *s* (*acerbitas*, Lat) 1 A rough sour taste 2 Applied to men, sharpness of temper (*Pope*)

ACERIDES, (from α neg and κηρος, wax) Plasters made without wax

ACERRA, in antiquity, an altar erected, among the Romans, near the bed of a person deceased, on which his friends daily offered incense till his burial

Acerra also signified a little pot wherein the incense and perfumes were put, to be burnt on the altars before the dead

ACEROSE LEAF (*acerosum folium*) In botany, linear and permanent, as in pine, fir, juniper, yew (*Lin Philos Bot* 42) In form of a needle, usually inserted at the base into the branch by articulation, as in the cone-bearing trees

To ACERVATE, *v a* (*acervo*, Lat) To heap up

ACERVATION, *s* (from *acervate*) The act of heaping together

ACESCENT, *a* (*acescens*, Lat) That has a tendency to sourness or acidity (*Arbuth*)

ACESIS, (ακεσις, from ακεομαι, to heal) 1 The herb water-sage, so called from the healing properties ascribed to it 2 A cure, or restoration to health

ACESTORIS, Acestrides, (ακεστορις and ακεστριδης, from ακεομαι, to heal) A female doctor or midwife

ACETABULUM, in antiquity, a measure containing about an eighth of our pint It frequently contained acetum, or vinegar, whence its name

Acetabulum (*acetabulum*, *n* from *acetum*, vinegar, so called because it resembles the acetabulum, or old saucer, in which vinegar was held for the use of the table) The cavity of the os innominatum which receives the head of the thigh-bone See Os innominatum

ACETARIA, (*acetaria*, *n* from *acetum*, vinegar because they are mostly made with vinegar) Sallads

ACETATED impregnated or combined with acid, the term is more particularly applied to combinations with vinegar or the acetous acid These combinations form neutral or secondary salts, which are now called acetites of those substances which were before said to be acetated

Acetated Vegetable Alkali See Kali acetatum

Acetated Volatile Alkali See Aqua ammoniæ acetatæ

ACETATS, in chemistry, certain neutral salts formed by the combination of the acetic acid, or radical vinegar, with different substances or bases These salts differ from acetites in this respect—the acid employed in the production of the former is fully saturated with oxygen, or the acidifying principle, that is, it is completely acid, while that which is used to form the latter, contains a less proportion of oxygen than is sufficient to saturate it The different acetats are expressed by the addition of the word denoting the substance to which the acid is united, as acetat of ammoniac or ammoniacal acetat, acetat of lime, acetat of zinc, &c It is a general character of acetats, that when decomposed by mineral acid, they evolve a very strong and pungent white vapour, but they are too imperfectly known to enable us to state, with clearness, their specific properties

ACETIC ACID, in chemistry, *Radical Vinegar*, *Concentrated Acid of Vinegar*, or *Spirit of Venus*, one of the vegetable acids, produced by distilling the acetous acid with metallic oxydes It is of a green colour, but becomes white by rectification It is extremely volatile and inflammable, corrodes and cauterizes the skin, and when heated in contact with air, takes fire Combined with earths, alkalis, and minerals, it forms salts called acetats It has a larger proportion of oxygen than acetous acid, or rather a less proportion of base, being supposed to be nothing else than that acid deprived of a portion of its carbon This acid dissolves several metals, which are not soluble in the acetous acid, and forms acetic ether by partly decomposing and uniting with alcohol Its specific gravity is about 1 0626, and is never when pure less than 1 050 Acetic acid is generally procured by distilling acetite of copper (distilled verdigrise) in a glass retort, with a regulated heat, till the bottom of the vessel is nearly red-hot it may also be obtained by distilling acetite of lead, soda, pot-ash, or lime, with sulphuric acid, but the product is contaminated by the gas of the latter acid A method, however, has lately been discovered and made known by Y Perts, jun (*Nicholson s Journal*, *N S* *No* I *p* 40) which he asserts will save three-fourths of the expence attending the common process, and produce an acid as white and pungent as that of commerce He directs to distil one part of sulphuric acid with two of good white vinegar, and to bring the mixture suddenly to ebullition the sulphuric acid that remains may serve for two more operations, but then it will be necessary to rectify the acid produced, as it will be impregnated with sulphureous acid gas —manganese is suggested for the purpose of rectification Acetic acid is frequently adulterated during the process of its formation, but oftener by design If it be contaminated by sulphureous acid, it may be known by drawing a little of the vapour into the lungs, when an unpleasant sensation will be felt, which, if the acid be pure, will not arise Sulphuric acid may be detected by a few drops of muriated barytes, or acetite of lead, which will form with it insoluble compounds, and fall down Tartareous acid is discovered by saturating with vegetable alkali (potash), which separates it in the form of white powder, copper, with carbonat of ammonia, and lead, by sulphuret of ammonia

ACETIFICATION, the action or operation by which vinegar is made. See ACETOUS FERMENTATION.

ACETITES, compound or neutral salts, formed by the union of the acetous acid, or distilled vinegar, with different bases: the following are the most remarkable of these substances, and those whose properties are best known.

Acetite of alumine, formerly known by the names of acetited clay and the aluminous mordant of the calico-printers, is formed by uniting the acetous acid with the latter substance, which can only be done by digesting the acid on alumine recently precipitated.

Acetite of ammonia, called formerly ammoniacal acetous salt, and generally known as the spirit of Mindererus, is prepared by adding carbonated ammonia to distilled vinegar till it is saturated, or by distilling equal parts of acetated lead (sugar of lead) and muriat of ammonia (sal ammoniac). This salt is very volatile, yet it may, by slow evaporation, be obtained in crystals which are pungent and speedily attract moisture: it is decomposed by fire, by alkalis, which disengage the ammonia, and by mineral acids, which separate the acetous.

Acetite of baryte, was first formed by Morveau (i.e. Guyton). It is usually prepared by adding carbonat of baryte to distilled vinegar (acetous acid), or, which is better, by boiling for a few minutes the sulphuret of baryte in a slight excess of acetous acid, filtering the solution, and setting it aside to evaporate: crystals may thus be obtained. This acetite has a pleasant taste, somewhat acid, is soluble in water, and does not deliquesce in the air: it is decomposable by most of the mineral acids. Its only use at present is as a re-agent, in detecting sulphuric acid.

Acetite of bismuth, called by Geoffroi, sugar of bismuth, has a sweetish taste, remains permanent in the air, and is decomposable by heat. It is easily procured by mixing together solutions of nitrat of bismuth, and acetite of potash.

Acetite of cobalt.

Acetite of copper, known to the ancients under the titles of crystals of Venus and verdigrise. It is of a deep green colour, has a disagreeable coppery taste, is soluble in water and in alcohol, effloresces in air, and is decomposed by heat. See VERDIGRIS.

Acetite of jargon or *jargonia*, formed by pouring acetous acid on newly precipitated jargonia, has an astringent taste, is very soluble in water and in alcohol; it does not crystallize, but when evaporated to dryness, it forms a powder, which does not attract moisture from the air.

Acetite of iron, or *martial acetous salt*, is composed of acetous acid and brown oxyd of iron. It has a styptic sweetish taste, attracts moisture from the atmosphere, is decomposed in distilled water, by fire, and gradually by air. It affords with nutgall a very black ink; alkaline prussiats precipitate from it a very bright Prussian blue. Black, yellow, and brown oxyd (or rust) of iron, form with vinegar solutions of a beautiful red colour.

Acetite of lead, *vinegar of Saturn*, *sugar of Saturn*, *extract of Saturn*, *sugar of lead*, &c. according to the way in which it is prepared, is composed of acetous acid and white oxyd of lead. It has a sweet taste, somewhat astringent, becomes yellow when exposed to the air; is decomposed by heat, and when distilled, the residuum takes fire spontaneously on exposure to the air. Paper dipped into acetite of lead forms excellent matches.

Acetite of lime, *calcareous acetite*, *salt of chalk*, or *salt of coral*, is composed of 35.7 parts of lime and 64.3 parts of acetous acid and water. It is readily procured by adding that acid to chalk, marble, coral, or any similar substances. It is sour, bitter, and rather caustic, easily soluble in water, effloresces in the air, is decomposed by fire, by fixed alkalis, and by mineral acids. It is used in medicine.

Acetite of magnesia, *magnesian acetous salt*, is prepared by saturating acetous acid with carbonat of magnesia, boiling the liquor, and filtering it if turbid. It is of a sweetish taste, is very soluble in water and alcohol, deliquesces in the air, and is decomposable by heat, mineral acids, baryte, lime, and the alkalis.

Acetite of mercury, *mercurial foliated earth*, is prepared in an instant by pouring a nitric solution of mercury into a solution of acetite of potash, by which means the acid is united with the mercury, and filtering the mixture. This salt has a disagreeable taste, and excites coughing; it becomes black by exposure to the air, and is decomposable by heat.

Acetite of potash, *arcanum tartari*, *sal acetatum*, *secret foliated earth of tartar*, *essential salt of wine*, *digestive salt of Sylvius*, occurs native in the sap and some other vegetable juices, and in the urine of some quadrupeds. It is composed of 61.5 parts of potash, and 38.5 of acetous acid and water, and is artificially prepared either by adding distilled vinegar to pearlash, or carbonat of potash, till the liquor contain a slight excess of acid, and then evaporating to dryness, if required; or by adding sulphat of potash to acetite of lime, evaporating to dryness, and dissolving out the acetite of potash by hot alcohol. Acetite of potash has a sharp warm taste, and a lively penetrating odour; it is soluble in alcohol, and in about ten times its weight of water; its crystals, which are obtained by cooling its hot saturated solution in alcohol, are very white, and assume the form of thin plates; it is very deliquescent in air, and melts like wax when heated. It is much used in medicine.

Acetite of silver, formed by dropping acetite

of soda or potash, into a saturated solution of nitrat of silver, has a sharp taste, and forms small oblong crystals, easily dissolved in water, it is decomposed by heat, and by muriat of magnesia

Acetite of soda, terra foliata mineralis, mineral acetous salt, is formed in crystals by adding distilled vinegar to carbonat of soda, evaporating to a pellicle, and cooling It has a sharp bitterish taste, is permanent in the air, soluble in water, and is melted in a strong heat It can only be obtained in crystals when there is an excess of alkali in the solution It is used sometimes in France as a medicine

Acetite of uranium, was first formed by Klaproth Its crystals are regular four-sided slender prisms, they are transparent, and of a beautiful yellow colour, they are decomposed by heat and what is singular, if they are heated gradually red hot, the oxyd which remains retains nearly the form of the crystals

Acetite of zinc, acetous salt of zinc, is soluble in water, decomposed by heat but not altered by exposure to the air, when thrown upon burning coals, it explodes with a blue flame, its crystals are rhomboidal or hexagonal plates, of a white colour, and have the appearance of talc

ACETOSA (from *aceto, to be sour*) Rumex acetosa of Linnéus Class hexandria order trigynia, common sorrel or sour-dock See RUMEX

ACETOSE *a* That has in it any thing sour, acetous

ACETOSELLA (dimin from *acetosa*) Wood sorrel See LUJULA

ACETOSITY *s* (from *acetose*) The state of being acetose, or of containing sourness

ACETOUS *a* (from *acetum* vinegar Lat) Having the quality of vinegar, sour (*Boyle*)

ACETOUS ACID *distilled vinegar* or the *acid of vinegar* is obtained from mucilaginous substances by that degree of fermentation which succeeds the spirituous, called the acetous fermentation and by concentrating the product It is a transparent colourless fluid, of the specific gravity of 1 0095, nearly as volatile as water, exhaling a pungent fragrant odour, and of a lively agreeable taste This acid is sometimes confounded with vinegar which is improper, because though it necessarily exists in that fluid yet it is seldom found there uncontaminated, and is always diluted It is indeed the purer part of vinegar, and is obtained from it by distillation or freezing or both See VINEGAR

Acetous acid is composed of oxygen hydrogen, and carbon but their relative proportions are not known, of the latter substance, however, this acid possesses a greater proportion than the acetic acid To obtain the acetous acid by distillation from vinegar it is necessary to make use of glass, or tinned copper vessels, or else a stone cucurbite with a capital The first product is a phlegm of a lively and agreeable smell, scarcely acid, to this succeeds the acetous acid, which becomes more acid though less odorous, as the process advances When about three fourths of the liquor is come over, the process should be stopped, only about two thirds of the product is good acid, the first being too much diluted, and such as ought to be rejected If distilled vinegar be exposed to frost, in a broad shallow vessel, and the ice removed as it forms, a still stronger and purer acid will be obtained, which, when crystallised, is called by Lowitz glacial vinegar His process is described in Crell's Journal and in the Supplement to Encyc Brit vol i p 231

Acetous acid unites eagerly with water, either liquid or congealed imbibing heat in the former case, and giving it out in the latter, it has very little action upon fat oils, but readily dissolves essential oils and imbibes their odours, it decomposes atmospheric air, by abstracting its oxygen, at a temperature a little above that of boiling water, at the same time giving out flame, and producing carbonic acid and water, lastly it is capable of combining with a great variety of bodies and thus forming salts called acetites—with the alkaline earths and alkalis it forms alkaline acetites, and with the oxides of metals (for it will not unite easily with the metals themselves, except iron and zinc) it forms metallic acetites See ACETITE, under which article the most important of these substances are described

Acetous acid is often adulterated if made in a still with a pewter head, it always contains lead in solution which may be discovered by mixing with the acid an equal quantity of water impregnated with sulphurated hydrogenous gas, when the metal will appear in the form of a black precipitate the presence of sulphurous acid is detected by nitrat of barytes or acetite of lead

Acetous acid is much used in medicine, and in the well known form of vinegar is employed as an agreeable condiment in our food, and for the preservation of animal and vegetable substances It is the *acetum distillatum* of the London College of Physicians

The French chemists Adet and Durracq are of opinion, that there exists no difference between the acetous and the acetic acids, except that the former contains a larger proportion of water and an extractive or mucilaginous matter, if this opinion be established, there will not be two different kinds of salts produced by its combination, but as there will be only the acetic acid, it will form acetats but not acetites, as has been hitherto believed See Philosophical Magazine vol xiii p 12, &c

ACETUM a term sometimes applied to vinegar, particularly in those preparations of which this substance forms the bases, as *acetum alkalizatum, acetum esuriens*, &c

ACETUM AROMATICUM, aromatic vinegar, an elegant preparation of the Edinburgh pharmacopoeia, formed and improved upon that

long known by the name of thieves' vinegar Its virtues are antiseptic, and its odour highly refreshing in hospitals, courts of justice, and other crowded places

ACETUM DISTILLATUM Distilled vinegar, acetous acid

ACETUM SCILLÆ, or scilliticum, vinegar of squills, a preparation attenuant, expectorant, and diuretic

ACHABYTUS, in ancient geography, a high mountain in Rhodes, on the top of which stood a temple of Jupiter

ACHÆANS, the inhabitants of Achaia Propria, a Peloponnesian state This republic was not considerable in early times for the number of its troops, nor for its wealth, nor for the extent of its territories; but it was famed for its probity, its justice, and its love of liberty Its high reputation for these virtues was very ancient The Crotonians and Sybarites, to re-establish order in their towns, adopted the laws and customs of the Achæans After the famous battle of Leuctra, a difference arose betwixt the Lacedæmonians and Thebans, who held the virtue of this people in such veneration, that they terminated the dispute by their decision The government of the Achæans was democratical The arms which the Achæans chiefly used were slings They were trained to the art from their infancy, by slinging from a great distance, at a circular mark of a moderate circumference By long practice they took so nice an aim, that they were sure not only to hit their enemies on the head, but on any part of the face they chose Their slings were of a different kind from those of the Balearians, whom they far surpassed in dexterity

ACHÆMENES The most remarkable of this name is a king of Persia, among the progenitors of Cyrus the Great, his descendants were called Achæmenides, and formed a separate tribe in Persia, of which the kings were members Cambyses, son of Cyrus, on his death-bed, charged his nobles, and particularly the Achæmenides, not to suffer the Medes to recover their former power, and abolish the empire of Persia

ACHAIA, a name taken for that part of Greece which Ptolemy calls Hellas the younger Pliny, Græcia, now called Livadia bounded on the north by Thessaly, the river Sperchius, the Sinus Maliacus, and mount Oeta, on the west by the river Achelous, on the east turning a little to the north, it is washed by the Archipelago, down to the promontory of Sunium, on the south, joined to the Peloponnesus, or Morea, by the isthmus of Corinth, five miles broad See LIVADIA

ACHAIA PROPRIA anciently a small district in the north of Peloponnesus, running westward along the bay of Corinth, and bounded on the west by the Ionian Sea, on the south by Elis and Arcadia, on the east by Sicyonia inhabitants, the Achæans, properly so called, its metropolis Patræ It is now called Romania Alta, in the Morea.

Achaia was also taken for all those countries that joined in the Achæan league, reduced by the Romans to a province Likewise for Peloponnesus

ACHANIA In botany, a genus of the class and order monadelphia, polyandria, thus generically characterised Calyx double, the outermost many-leaved, corol convolute, and closed, stigmas, ten, berry, five celled, five-seeded It is a native of South America, and the West Indian islands, and only three species of it have been discovered a malvaviscus, a mollis, and a pilosa

ACHAT, in law, implies a purchase or bargain hence, purveyors were formerly called achators, from their making bargains

ACHATES (αχατης, from a river of that name where it is found, or ακος, *a cure*, as being efficacious in medicine) The achates, or agate

ACHATONYX (αχατονυξ) A species of agate mixt with onyx

ACHE s (ece, Saxon, ἄχος, Greek) A continued pain (*Shakspeare*)

To ACHE *v n* To be in pain (*Glanv*)

ACHELOUS, in fabulous history, wrestled with Hercules, for no less a prize than Deianira, daughter to king Oenus but as Achelous had the power of assuming all shapes, the contest was long dubious at last, as he took that of a bull, Hercules tore off one of his horns, so that he was forced to submit, and to redeem it by giving the conqueror the horn of Amalthea, the same with the Cornucopia, or horn of plenty, which Hercules having filled with a variety of fruits, consecrated to Jupiter Some explain this fable by saying, that Achelous is a winding river of Greece, whose stream was so rapid that it roared like a bull, and overflowed its banks, but Hercules by bringing it into two channels, broke off one of the horns, and so restored plenty to the country

ACHEM, a large country of the East Indies, north of the kingdom of Ava, very little known to Europeans

ACHEM, the capital of the island of Sumatra, East Indies This city is large and populous, the houses are ascended by steps and ladders, being built on piles which are about two feet above the level of the ground, because in the rainy season the city is much overflowed The Europeans who inhabit this place, are chiefly English Dutch, Danes, and Portuguese, who with the Guzurats and Chinese, are the principal traders The natives are very jealous of the Europeans, and always go armed Lat 5 22 N Lon 95 40 E

ACHERNER a star of the first magnitude, in the southern extremity of the constellation Eridanus, invisible in our latitude See ERIDANUS

ACHERON, in heathen mythology, a river of Epirus, which according to some, rose out of the lake Acherusia in Epirus, and emptied

itself into the bay of Ambracia Others make it a sulphureous stinking lake near cape Misenum, in the bay of Naples The poets feigned it to be the son of Titan or Terra, or as others say, of Ceres, and that he was born in a cave without a father, and sent to hell for furnishing the Titans with water during their war with the gods, where he was turned into a river, over which departed souls were ferried

ACHERSET, an ancient measure of corn, conjectured to be the same as our quarter, or eight bushels

ACHIAR, a Malayan word, which signifies all sorts of fruits and roots pickled with vinegar and spice

ACHICOLUM, the sweating room, or *sudatorium*, of the ancient baths

To ACHIEVE *v a* (*achever*, Fr) 1 To perform, to finish (*Dryden*) 2 To gain, to obtain (*Milton*)

ACHIEVEMENT *s* (*achevement*, Fr) 1 The performance of an action (*Spenser*) 2 The escutcheon, or ensigns armorial (*Dryden*)

ACHIEVER *s* (from *achieve*) He that performs what he endeavours after (*Shakspeare*)

ACHILLEA Yarrow, or milfoil a genus of the Linnean class and order syngenesia superflua, whose character is as follows Receptacle chaffy, downless, calyx ovate, imbricate, unequal, florets of the ray from five to ten, inversely heart-shaped, or roundish Its species are very numerous, not less than forty-five having been already detected and described, which may be arranged into those with undivided leaves, with pinnatifid or feather cleft leaves, with pinnate leaves and flat leaflets, with pinnate leaves, the outermost leaflets confluent, with leaves doubly pinnatifid or feather cleft

The species are all natives of Europe, chiefly of the southern parts but with respect to the greater number of them, not difficult to be met with in any part A ptarmica, or sweet wort and a millefolium, common yarrow, are those most commonly found in our own country, the former inhabiting our groves and forests, the latter our wastes and commons

ACHILLEA AGERATUM (αχιλλεια from Achilles, who is said to have cured Telephus with it) The systematic name for the ageratum of the pharmacopœias

ACHILLEA FOLIIS PINNATIS True genipi, which see

ACHILLEA MILLEFOLIUM The systematic name for the millefolium of the pharmacopœia. See MILLEFOLIUM

ACHILLEA PTARMICA The systematic name for the PHARMACEUTIC PTARMICA, which see

ACHILLEID ACHILLEIS, a celebrated poem of Statius, in which that author proposed to deliver the whole life and exploits of Achilles but being prevented by death, he has only treated of the infancy and education of that hero

ACHILLES, the son of Peleus and Thetis, was the bravest of all the Greeks in the Trojan war During his infancy, Thetis plunged him in the Styx, and made every part of his body invulnerable, except the heel, by which she held him His education was entrusted to the centaur Chiron, who taught him the art of war, and made him master of music He was taught eloquence by Phœnix, whom he ever after loved Thetis, to prevent him from going to the Trojan war, where she knew he was to perish, privately sent him to the court of Lycomedes, disguised in a female dress By his familiarity with the king's daughters here, he made Deidamia mother of Neoptolemus As Troy could not be taken without Achilles, Ulysses went to the court of Lycomedes in the habit of a merchant, and exposed jewels and arms to sale Achilles, choosing the arms, discovered his sex, and went to war Vulcan, at the entreaties of Thetis, made him a strong armour, which was proof against all weapons He was deprived by Agamemnon of his favourite mistress Briseis, who had fallen to his lot at the division of the booty of Lyrnessus For this affront, he refused to appear in the field till the death of his friend Patroclus recalled him to action, and to revenge (Vide PATROCLUS) He slew Hector, the bulwark of Troy, tied the corpse by the heels to his chariot and dragged it three times round the walls of Troy After thus appeasing the shades of his friend, he permitted old Priam to carry away Hector's body In the tenth year of the war, Achilles was charmed with Polyxena, and as he solicited her hand in the temple of Minerva, it is said that Paris aimed an arrow at his vulnerable heel, of which wound he died His body was buried at Sigæum, and divine honours were paid to him, and temples raised to his memory Some ages after the Trojan war, Alexander, going to the conquest of Persia, offered sacrifices on the tomb of Achilles, and admired the hero who had found a Homer to publish his fame to posterity Achilles is supposed to have died 1183 years before the Christian era

ACHILLES, a name given by the schools to the principal argument alleged by each sect of philosophers in behalf of their system. In this sense we say this is his Achilles, that is, his master-proof alluding to the strength and importance of the hero Achilles among the Greeks Zeno's argument against motion is peculiarly termed Achilles That philosopher made a comparison between the swiftness of Achilles, and the slowness of a tortoise, pretending that a very swift animal could never overtake a slow one that was before it and that therefore there is no such thing as motion for, said he, if the tortoise were one mile before Achilles, and the motion of Achilles one hundred times swifter than that of the tortoise, yet he would never

overtake it, and for this reason, namely, that while Achilles runs over the mile, the tortoise will creep over one hundredth part of a mile and will be so much the foremost again while Achilles runs over this $\frac{1}{100}$th part, the tortoise will creep over the 100th part of that $\frac{1}{100}$th part, and will still be this last part the foremost, and so on continually, according to an infinite series of 100th parts from which he concluded that the swifter could never overtake the slower in any finite time, but that they must go on approaching to infinity But this sophism lay in Zeno's considering as an infinite time the sum of the infinite series of small times in which Achilles could run over the infinite series of spaces, $1 + \frac{1}{100} + \frac{1}{10000} + \frac{1}{1000000}$ &c not knowing that the sum of this infinite series is equal to the quantity $1\frac{1}{99}$ of a mile, and that therefore Achilles will overtake the tortoise when the latter has crawled over $\frac{1}{99}$th of a mile Nay though we should grant, contrary to what is just shewn, that Achilles would never pass by the snail, yet it would not follow that there would be no motion for each of them would, even according to Zeno's statement, approach nearer and nearer to the other which could not be the case unless there was motion in one or in both

ACHILLIS TENDO Tendon of Achilles (So called from the fable that Thetis the mother of Achilles held him by this part of his body when she dipped him in the river Styx to make him invulnerable Homer describes this tendon, but the immediate cause of its assuming the name of the Grecian hero is still uncertain) The strong tendon of the gastrocnemius and soleus muscles, which is inserted into the heel See GASTROCNEMIUS and SOLEUS

ACHILLINI (Alexander) an eminent philosopher and physician, of Bologna where he died in 1512 aged 40 He is said to have discovered the malleus and incus, two small bones in the organ of hearing His works were published in folio at Venice, in 1545

ACHIMBASSI the name of an officer who presides over the practice of medicine at Cairo

ACHIROPŒTOS a name given by ancient writers to certain miraculous pictures of Christ and the Virgin supposed to have been made without hands

ACHIVI the name of the inhabitants of Argos and Lacedæmon before the return of the Heraclidæ by whom they were expelled from their possessions eighty years after the Trojan war The appellation of Achivi is indiscriminately applied by the ancient poets to all the Greeks (*Paus &c*)

ACHOR, in mythology, the god of flies

ACHMELLA The herb and seeds of this plant, spilanthus achmella of Linnéus, spilanthus foliis ovatis, serratis, caule erecto, floribus radiatis, are employed in cases of calculus of the kidneys and urinary bladder It is extremely bitter and balsamic and is given in the form of infusion See SPILANTHUS

ACHORES, (*achores, pl m* from αχωρ, *quasi* αχυρον, from αχον, bran, from the branny scales thrown off) A disease which attacks the hairy scalp of the head, for the most part of young children, forming soft and scaly eruptions

ACHRAS SAPOTA A genus of the Linnean class and order hexandria monogynia, thus characterised calyx six-leaved, corol ovate, six-cleft with as many alternate interior scales pome, ten-celled, seeds solitary, with a marginal scar and process at the top There are only three known species, one of which has been traced in the Friendly Islands, and the other two in South America

ACHROMATIC an epithet expressing want of colour The word is Greek, being compounded of α privative, and χρωμα, colour The term was first applied to telescopes by Dr Bevis

ACHROMATIC TELESCOPES, are telescopes contrived to remedy the aberrations in colours One of the inventors of this kind of telescopes was the late Mr John Dollond, optician to the king They have been improved by his son, and by other persons Every ray of light passing obliquely from a rarer into a denser medium changes its direction towards the perpendicular, and every ray passing obliquely from a denser into a rarer medium, changes its direction from the perpendicular This bending of the ray caused by the change of its direction is called its refraction and the quality of light which subjects it to this refraction is called its refrangibility Every ray of light, before it is refracted is white, though it consists of a number of component rays each of which is of a different colour As soon as it is refracted, it is separated into its component rays which, from that time proceed diverging from each other, like rays from a centre and this divergency is caused by the different refrangibility of the component rays, in such sort that the more the original or component ray is refracted the more will the compound rays diverge when the light is refracted by one given medium only From hence it has been concluded, that any two different mediums that can be made to produce equal refractions will necessarily produce equal divergencies whence it should also follow, that equal and contrary refractions should not only destroy each other, but that the divergency of the colours caused by one refraction, should be corrected by the other and that to produce refraction that would not be affected by the different refrangibility of light is impossible But Mr Dollond has proved, by many experiments, that these conclusions are not well founded from his experiments it appeared, that a ray of light, after equal and contrary

refractions, was still spread into component rays differently coloured: in other words, that two different mediums may cause equal refraction, but different divergency; and equal divergency, with different refraction. It follows therefore that refraction may be produced, which is not affected by the different refrangibility of light. In other words, that, if the mediums be different, different refractions may be produced, though at the same time the divergency caused by one refraction shall be exactly counteracted by the divergency caused by the other: and so an object may be seen through mediums, which together cause the rays to converge, without appearing of different colours. This is the foundation of Mr Dollond's improvement of refracting telescopes.

By subsequent experiments, he found that different sorts of glass differed greatly in their refractive qualities, with respect to the divergency of colours. He found that crown glass causes the least divergency, and white flint the most, when they are wrought into forms that produce equal refractions. He ground a piece of white flint glass into a wedge, whose angle was about 25 degrees; and a piece of crown glass to another, whose angle was about 29 degrees; and these he found refracted nearly alike; but that their divergency of colours was very different. He then ground several other pieces of crown glass to wedges of different angles, till he got one that was equal, in the divergency it produced, to that of a wedge of flint glass of 25 degrees; so that when they were put together, in such a manner as to refract in contrary directions, the refracted light was perfectly free from colour. Then measuring the refraction of each wedge, he found that that of the white flint glass, was to that of the crown glass nearly as two to three. And hence any two wedges, made of these two substances,[1] and in this proportion, would when applied together so as to refract in contrary directions, refract the light without any effect arising from the different refrangibility of the component rays. Therefore, to make two spherical glasses that refract the light in contrary directions, one must be concave and the other convex; and as the rays after passing through both must meet in a focus, the excess of the refraction must be in the convex one; and as the convex is to refract most, it appears from the experiment that it must be made of crown glass, and as the concave is to refract least, it must be made of white flint. And further, as the refractions of spherical glasses are in an inverse ratio of their focal distances, it follows that the focal distances of the two glasses should be in the ratio of the refractions of the wedges: for, being thus proportioned, every ray of light that passes through this combined glass, at whatever distance from its axis, will constantly be refracted by the difference between two contrary refractions, in the proportion required, and therefore the effect of the different refrangibility of light will be prevented. The removal of this impediment, however, produced another: for the two glasses, which were thus combined, being segments of very deep spheres, the aberrations from the spherical surfaces became so considerable, as greatly to disturb the distinctness of the image. Yet considering that the surfaces of spherical glasses admit of great variations, though the focal distance be limited, and that by these variations their aberration might be made more or less at pleasure, Mr Dollond plainly saw that it was possible to make the aberrations of any two glasses equal; and that, as in this case the refractions of the two glasses were contrary to each other, and their aberrations being equal, these would destroy each other. Thus he obtained a perfect theory of making object glasses, to the apertures of which he could hardly perceive any limits; for if the practice could come up to the theory, they must admit of apertures of great extent, and consequently bear great magnifying powers. The difficulties of the practice are, however, still very considerable. For first, the focal distances as well as the particular surfaces, must be proportioned with the utmost accuracy to the densities and refracting powers of the glasses, which vary even in the same sort of glass, when made at different times. Secondly, the four surfaces are to be wrought perfectly spherical. Still Mr Dollond could construct refracting telescopes upon these principles with such apertures and magnifying powers under limited lengths, as greatly exceed any that were before produced, in the formation of images, bright, distinct and comparatively uncoloured about the edges. (Hutton's Dictionary.) The defects which were yet unremedied in Mr Dollond's telescope have called forth the exertion of other philosophers, and many contrivances have been invented. Father Boscovich, to whom every branch of optics is much indebted, has, in his attempts for this purpose, displayed much ingenuity; but the philosopher whose exertions have been crowned with most success, and who has perhaps made the most important discovery in this branch of science since the era of Newton, is Dr Robert Blair, regius professor of astronomy in the college of Edinburgh. By a judicious set of experiments, ably conducted, he has proved that the quality of dispersing the rays in a greater degree than crown glass, is not confined to a few mediums, but is possessed by a great variety of fluids, and by some of these in a most extraordinary degree. He has shown that although the greater refrangibility of the violet rays than of the red rays, when light passes from any medium whatever into a vacuum, may be considered as a law of nature, yet in the passage of light from one medium into another, it depends entirely on the qualities of the mediums which of these rays shall be the most refrangible, or whether there shall be any difference in their refrangi-

bility. In order to correct the aberration arising from difference of refrangibility among the rays of light, he instituted a set of experiments, in the conducting of which he detected a very singular and important quality in the muriatic acid. In all the dispersive mediums hitherto examined, the green rays, which are the mean refrangible in crown glass, were found among the less refrangible, but in the muriatic acid, these same rays were by him found to make a part of the more refrangible. This discovery led to complete success in removing the great defect of optical instruments, viz that dissipation or aberration of the rays which arises from their unequal refrangibility, and has hitherto rendered it impossible to converge all of them to one point either by single or opposite refractions. A fluid in which the particles of muriatic acid and metalline particles hold a due proportion, at the same time that it separates the extreme rays of the spectrum much more than crown glass, refracts all the orders of the rays in the same proportion that glass does; and hence rays of all colours made to diverge by the refraction of the glass, may either be rendered parallel by a subsequent refraction made in the confine of the glass and this fluid, or, by weakening the refractive density of the fluid the refraction which takes place in the confine of it and glass may be rendered as regular as reflection, without the least colour whatever. The doctor has a telescope, not exceeding fifteen inches in length, with a compound object glass of this kind, which equals in all respects, if it does not surpass, the best of Dollond's forty-two inches long. Of this object glass a figure will be found in the third volume of the Transactions of the Royal Society of Edinburgh, and to that volume we must refer our readers for a full and perspicuous account of the experiments which led to this discovery, as well as of the important purposes to which it may be applied. A judicious abridgment of this paper may be seen in Nicholson's Journal, vol. i 4to p. 1—12. In the Gentleman's Magazine for 1790, (p. 890), there is a paper on the achromatic telescope, by a writer under the signature of Veritas, who ascribes the invention to a gentleman whose name we have not yet mentioned in these words: "As the invention has been claimed by M. Euler, M. Klingenstierna, and some other foreigners, we ought for the honour of England, to assert our right, and give the merit of the discovery to whom it is due, and therefore, without farther preface I shall observe, that the inventor was Chester More Hall, Esq of More Hall, in Essex, who about 1729, as appears by his papers, considering the different humours of the eye, imagined they were placed so as to correct the different refrangibility of light. He then conceived that if he could find substances having such properties as he thought these humours might possess he should be enabled to construct an object glass that would shew objects colourless. After many experiments, he had the good fortune to find those properties in two different sorts of glass, and making them disperse the rays of light in different directions," he succeeded. About 1733 he completed several achromatic object glasses, (though he did not give them this name), that bore an aperture of more than two inches and a half, though the focal length did not exceed twenty inches, one of which is now in the possession of the rev. Mr Smith, of Charlotte-street, Rathbone place. This glass has been examined by several gentlemen of eminence, and scientific abilities, and found to possess the properties of the present achromatic glasses. Mr Hall used to employ the working opticians to grind his lenses, at the same time he finished them with the radii of the surfaces, not only to correct the different refrangibility of rays, but also the aberration arising from the spherical figure of the lenses. Old Mr Bass, who at that time lived in Bridewell precinct, was one of these working opticians, from whom Mr Hall's invention seems to have been obtained. In the trial at Westminster hall, about the patent for making achromatic telescopes, Mr Hall was allowed to be the inventor, but lord Mansfield observed that "it was not the person who locked up his invention in his scrutoire, that ought to profit by a patent for such invention but he who brought it forth for the benefit of the public." This perhaps might be said with some degree of justice, as Mr Hall was a gentleman of property, and did not look to any pecuniary advantage from his discovery, and consequently it is very probable that he might not have an intention to make it generally known at that time. That Mr Ayscough, optician at Ludgate-hill, was in possession of one of Mr Hall's achromatic telescopes in 1754, is a fact which at this time will not be disputed.

ACHRONICAL. See ACRONYCHAL.

ACHTIAR, in geography, a small commodious haven near Inturman in the Black Sea.

ACHYRANTHES. In botany, a genus of the Linnæan class and order pentandria monogynia, thus generically characterised: calyx five-leaved, corolless, stigma bifid, seeds solitary. The known species are sixteen, which are found in the warmer climates of Asia, Africa, and America. No species has hitherto been detected of natural growth in any part of Europe.

ACHYRONIA. A plant lately introduced into our green-houses from Botany-bay. In the Linnæan system it forms a genus in the class and order diadelphia decandria, the following is its generic character: Calyx five-toothed, the lower tooth elongated and cloven, legume or pod compressed, many seeded. One single species of this plant is the whole that has yet been noticed by botanists.

ACHYROPHORUS. In botany. See HYPOCHÆRIS.

ACIA. In botany, a genus of plants in the Linnæan class and order monadelphia dode-

oandria, thus generically characterised: calyx five-parted; petals five; drupe dry, coriaceous, fibrous, one-seeded. There are only two species, both of which are natives of Guiana.

*ACICARPHA. In botany, a genus of the Linnéan class and order syngenesia polygamia necessaria, thus characterised: receptacles chaffy, the chaff uniting with the seeds after flowering; downless, seeds naked; all the florets tubular; calyx five-parted. The only species yet known is a native of Buenos Ayres, and was first described by Jussieu.

ACI'CULAR, Acicularis. In botany, shaped like a small needle. Also the trivial name of a small sharp-pointed scirpus.

ACID, in chemistry, the generic name of a comprehensive class of salts, which possess the following properties: sourness of taste, a power of changing blue vegetable colours red, of forming with water a combination whose specific gravity is not a medium between the water and the acid; and of combining (and usually effervescing) with all the alkalis, and most of the metallic oxyds and earths, by which means those compounds are formed which are called neutral, or secondary salts. Though every acid does not possess all these properties, yet they all possess a sufficient number of them to distinguish them from other substances. The form under which acids most commonly appear, is that of a transparent liquor; in which case they are generally combined with a greater or less quantity of water: several of them, however, are found in a solid state, which some have supposed is their natural condition. Since all acids resemble each other in so many particulars, it was natural to presume that they likewise resembled each other in their intimate nature, and possessed some homogeneous principle. Paracelsus believed that there was only one acid principle in nature, which communicated taste and solubility to the bodies in which it was combined. Beccher embraced the same opinion, and believed also, that this acid principle was a compound of earth and water, which he considered as two elements. Stahl adopted the theory of Beccher, and endeavoured to prove that this acid principle was the sulphuric acid, of which, according to him, all the other acids were mere compounds. But his proofs were only conjectures or vague experiments, from which nothing could be deduced. Nevertheless his opinion, like every other which he advanced in chemistry, continued to have supporters for a long time, and was even countenanced by Macquer. At last its defects began to be perceived; Bergman and Scheele declared openly against it; and their discoveries, together with those of the French chemists, notwithstanding the attempts of Monnet to support it, demonstrated the falshood of both parts of the theory, by shewing that sulphuric acid did not exist in the other acids, and that it was not composed of water and earth, but of sulphur and oxygen. The opinion, however, that acidity was owing to some common principle, was not abandoned. Wallerius, Meyer, and Sage, had advanced different theories in succession about the nature of this principle, but as they were founded rather on conjecture and analogy, than direct proof, they obtained but few advocates. At last Lavoisier, by a number of ingenious and accurate experiments, proved that several combustible substances when united with oxygen, form acids; that a great number of acids contain oxygen; and that when this principle is separated from them, they lose their acid properties. He concluded, therefore, that the acidifying principle is oxygen, and that acids are nothing else than combustible substances combined with oxygen, and differing from one another according to the nature of the combustible base or radical of the acid: an opinion which almost every subsequent observation has confirmed, which scarcely any one has been found to oppose, and which therefore is deservedly most prevalent among chemists of the present day. The chief, and indeed the only objections hitherto known to this theory are, first, that the prussic acid has not been proved to possess oxygen as one of its constituent parts: secondly, that neither the muriatic, fluoric, nor boracic acid, has hitherto been decomposed: we are ignorant of their respective natures. With regard to the first objection, however, it becomes us to observe, that if the experiments of Vauquelin and Fourcroy have not been quite decisive that the prussic acid contains oxygen, they are very nearly, and in the opinion of Fourcroy himself perfectly so; and that it is highly probable additional experiments now making upon this substance will very shortly remove every shadow of doubt from the bosoms of the most sceptical. With regard to the three other acids, it is for the present sufficient to remark, that since every acid which has been analysed, (if we except the prussic), is known to consist of oxygen and a combustible base, either simple or compound, it is certainly consistent with the principles of philosophy to assume that as a general law which is founded upon general experiments, and which, if not universally confirmed, has in no instance been contradicted. Such then is the theory of Lavoisier, the most beautiful, simple, and satisfactory that has yet been advanced on the subject.

There are two methods of acquiring a knowledge of the nature of acids: one, by forming them from their constituent parts, or uniting

* We cannot here introduce any kind of reasoning upon the very curious series of experiments in which Mr Davy is engaged on the nature of alkalis, which have also been found, so far as he has decomposed them, to contain a considerable portion of oxygen. We shall probably give the result, and offer some observations upon the general change which such experiments are likely to produce in the science and system of chemistry in a Supplement to this work, unless they should be so speedily completed as to enable us to examine them in the article OXYGEN.

with oxygen such substances as are capable of becoming acid by a union with it, the other, by decomposing them, or depriving them of their oxygen by the aid of substances with which this principle has a greater affinity. By the last of these methods, as has been shewn above, it has been proved in a great variety of instances, that oxygen is the principle of acidity, and by the first, the same truth has been made equally clear, for on combining various substances with oxygen, the particular acids were produced which are distinguished by the names of those substances. Assuming it then as a fact for the present, that oxygen is common to all acids, and the cause of their acidity, we proceed to observe that there are three states in which acids may exist, occasioned by the different degrees in which the acidifiable base is combined with oxygen. In the first they contain the least possible quantity of oxygen to render them acid, and are designated in the reformed chemical nomenclature by the termination *ous*: thus we say, the sulphurous, nitrous, phosphorous, or acetous acid. The second state of acids, is that in which they contain more oxygen, and in general are completely saturated with it: this state is expressed by the termination *ic*, as the sulphuric, nitric, phosphoric, or acetic acid. In the third state they contain an excess of oxygen, when they are said to be oxygenated, and are distinguished by the prefix *oxy*, as oxy-muriatic acid. When metallic and other substances are combined with a less proportion of oxygen than is sufficient to render them acid, they are said to be oxydated, and the substances produced are called oxyds. Acids with different proportions of oxygen, may be formed by uniting the radical with such determinate quantities of it as are necessary to convert them into the state required, as is done with sulphur, phosphorus, or arsenic; or by extracting from acids fully saturated with oxygen, a sufficient proportion of this principle, by means of combustible substances which absorb it with avidity. The latter method is often used to decompose acids, by depriving them of all the oxygen they contain: hot charcoal is employed for this purpose, and most of the metals, phosphorus, sulphur, and hydrogen in a dry solid state, as it exists in vegetable compounds, possess the same property. Formerly acids were divided into mineral, vegetable, and animal, according to their supposed origin; this division is still retained by some, though it is incorrect, as many of them are found in all the three natural kingdoms. The most judicious method, perhaps, is to arrange them in four classes, according to their bases or radicals. First, those with simple radicals, of different kinds. Secondly, those with double radicals, viz. carbon and hydrogen, in different proportions. Thirdly, those with triple radicals, carbon, hydrogen, and azote. And fourthly, those with unknown radicals. The old chemists were only acquainted with the three mineral acids as they are called, the sulphuric, the nitric, and the muriatic, beside the acetous acid, or vinegar. The moderns have very much increased the number, as will appear by the following alphabetic list.

TABLE OF ACIDS.

Acetic acid, or radical vinegar, is composed of 50.19 parts of oxygen, 13.94 of hydrogen, and 35.87 carbon, in 100 parts of acid. Its taste is extremely sour, its odour penetrating, and its specific gravity 1.0626, that of water being 1.0000.

Acetous acid, or distilled vinegar, is usually supposed to be different from the preceding, in containing a less proportion of oxygen, and exhibiting other properties, but Gren, Adet, Darracq, and Proust, have rendered it probable that it is the same acid in a less degree of concentration, or with the addition of water and mucilaginous matter.

Amniotic acid, first obtained from the liquor in the amnios of the cow, whence its name. Taste, slightly acid.

Arsenic, composed of 34.6 parts of oxygen, and 65.4 of arsenic. Specific gravity, 3.391. Taste, when solid, very slight, but dissolved in water, very acid.

Arsenious acid, or white oxyd of arsenic, is less oxygenated than the former, and has a weak sub-acid taste.

Benzoic, obtained by sublimation from the resinous substance called benzoin or benjamin, is composed of oxygen, hydrogen, and carbon: proportion unknown. Taste, acrid and hot. Specific gravity, 0.667.

Bombic, from the chrysalis of the silk-worm. Nature not known.

Boracic, from borax, though frequently examined, it has never been decomposed: its component parts are therefore unknown to us. Taste, first sourish, then rather bitter, afterwards sweet. Specific gravity, 1.479 in scales, 1.803 in fusion.

Camphoric, from camphor, taste acid and somewhat bitter. Supposed by some to be the same with the benzoic, and by others considered as a distinct acid.

Carbonic, formed by the union of eighty-two parts of oxygen and eighteen of carbon. Specific gravity, in the state of gas, 0018, of water saturated with it 1.0015.

Chromic contains thirty-three parts of the metal chromium, and sixty-seven of oxygen. Taste acrid. Crystals of a ruby red colour.

Citric, composed of oxygen, hydrogen, and carbon, proportion not known. Taste, very acid.

Columbic, exists in the ore of columbium, and is composed of that metal and oxygen.

Fluoric, is obtained from fluor-spars, its composition is unknown. The distinguishing property of this acid is that of corroding glass and siliceous bodies. Specific gravity, 1.500.

Formic, or acid of ants, is now discovered to be a mixture of acetic and malic acids.

Gallic, composed of oxygen, hydrogen, and

a great proportion of carbon When pure, it is in the form of transparent plates Taste, acid, and somewhat astringent

Laccic, from white lac, composed of the same ingredients as the preceding, in different proportions, form, liquid, sp gr 1 025, at 60°

Lactic, from the whey of milk, is also composed of oxygen, hydrogen, and carbon Taste, sour, form, solid, but becomes liquid by attracting moisture

Lithic, obtained by distilling the urinary calculus, is solid and crystalline It is on account of its origin, often called uric

Malic from the juice of apples &c is composed of oxygen, hydrogen, and carbon, form liquid, of a reddish colour, taste, very sour

Mellitic, from honey stone, consists of the same ingredients as the former in many respects it resembles the oxalic

Molybdic, composed of molybdenum and oxygen, is a white powder of a sharp, metallic taste specific gravity 3 4

Mucic, or mucous, obtained by treating gum-arabic, &c with nitrous acid, from its having been first procured by treating sugar of milk in a similar manner, it was called saccholactic acid Its form is that of a white gritty powder, taste, slightly acid Composed of oxygen, hydrogen and carbon Specific gravity of its solution in water, 1 0015

Muriatic composition not clearly ascertained In its pure state or that of gass, its taste is very acid, and its specific gravity, 002315, nearly double the weight of common air, in its liquid state when absorbed by water, its specific gravity is 1 500 Oxy muriatic acid contains more oxygen than the former being composed of sixteen parts of oxygen, and eighty four of acid Form gass, taste, astringent Specific gravity of water saturated with it 1 003 This is rather an oxyd than an acid Hyperoxymuriatic acid contains still more oxygen, being formed of sixty-five parts of it to thirty five of muriatic acid it has not yet been procured in a separate state

Nitric from nitre is composed of seventy and a half parts of oxygen to twenty nine and a half of azot or nitrogen Form liquid, taste, very acid and peculiar, specific gravity, 1 1040 to 1 563

Nitrous composed of nitric acid and nitrous gas specific gravity varies from blueish green 1 475, to yellow 1 502

Nitro-muriatic (or aqua regia), is a combination of nitrous and muriatic acids, or rather of these two and oxy-muriatic

Oxalic, composed of seventy seven parts of oxygen, ten of hydrogen, and thirteen of carbon Taste, very acrid, specific gravity of a saturated solution in water of 65 7°, 1 0593

Phosphoric, consists of about sixty parts of oxygen, to forty of phosphorus Taste, very acid, specific gravity when dry, 2 687 in the state of gass, 2 8516 in that of deliquescence, 1 417 It is obtained from animal, vegetable, and even mineral substances

Phosphorous, contains less oxygen than the preceding Proportion not known

Prussic, composed of hydrogen, azote, and carbon the existence of oxygen in this acid has not been clearly proved Form, liquid, colourless, taste, sweetish, acrid, and hot Oxy prussic, is a combination of this with oxygen

Pyrolignous, *Pyromucous*, and *Pyrotartarous* acids obtained by distillation from wood, sugar, and tartar respectively, are now ascertained to be merely acetic acid, holding in solution a portion of empyreumatic oil previously they were considered as distinct and peculiar

Rosacic, so called from its colour, is obtained from the lateritious sediment deposited by urine in fever, or during the paroxysm of the gout

Saccholactic See *Mucic*

Sebacic from tallow or fat, composed of oxygen hydrogen, and carbon in appearance resembling fat, taste slightly acid It is equally obtained from animal and vegetable substance

Suberic from cork, form solid or powdery, taste, acid, and slightly bitter

Succinic from amber, form solid, taste, strongly acid, composed of oxygen, hydrogen, and carbon

Sulphuric, composed of 38 5 parts of oxygen, and 61 5 of sulphur, form, liquid, taste, strongly acid specific gravity when much concentrated, 1 85 to 2 000

Sulphurous, composed of thirty-two parts of oxygen, and sixty eight of sulphur, specific gravity of gas, 00 40 (*Bergman*) or 00251 (*Lavoisier*), of liquid, i e water saturated with it, 1 0513 (*Thomson*)

Tartaric, from tartar &c is composed of 70 5 parts of oxygen nineteen of carbon and 10 5 of hydrogen, form solid, specific gravity 1 5962 dissolved in water 1 230, taste, exceedingly sour

Tungstic, composed of twenty parts of oxygen and eighty of the metal tungsten, form, yellow powder, no taste, specific gravity about 6 12

Zoonic from animal fibres, or the gluten of wheat &c is nothing more than acetic acid, holding in solution an animal matter resembling oil

Other acids have been mentioned by various authors, particularly those from metals, such as auric, bismuthic, [illegible], stannic, platinic, &c, but their acid characters are very ambiguous indeed they are rather to be considered as metallic oxyds, than as acids The specific gravity of water being 1 000 and that of atmospheric air 0012, it is easy to discern from the above table, as far as the specific gravities of acids are determined, which of the fluids are heavier than water, and which of the gasses are heavier than common air and vice versa These acids will be described under their specific names

The medical uses of acids are considerable and important In various forms and combinations

they are employed internally, as tonics, antiseptics, and febrifuges They give additional action to the stomach, and probably promote the secretion of gastric juice scorbutic affections seem often to fly before them as though they were a specific remedy, or positive antidote, combined or neutralized with alkalis, they diminish febrile thirst, and excite salutary perspiration and as an ingredient in ptisans, add equally to the agreeableness of their flavour, and their intention as sedatives Externally they are applied as astringents and corroborants to parts debilitated by accidents, as antiseptics to parts that are sphacelated or gangrenous, and as refrigerants to parts that are inflamed In a highly concentric state, they are supposed to change the nature of the miasmic septon in typhous, and other putrescent fevers, and for this purpose have, of late, been very generally employed in the form of vapour, especially the nitric and muriatic acid On these accounts, many of the acids enumerated in the preceding catalogue, have retained a place or found an introduction into the pharmacopœias of the royal medical colleges, both of London and Edinburgh in which they occur under the following names, and for the following purposes

Acidum muriaticum Spiritus salis marini Glauberi Muriatic acid Marine acid Spirit of salt Muriatic acid is much esteemed as an antiseptic, and therefore given with bark, &c in putrescent diseases It, however, mostly proves purgative A celebrated physician on the continent, whose success in curing typhoid fevers was unrivalled, lately published his method of cure, in consequence of a handsome annuity from the king of Prussia, which consisted in giving very large doses of this acid

Acidum nitricum Nitric acid This acid has lately been extolled as an antisiphilitic It may be given with advantage in mixed cases of siphilis and rheumatism as an antiseptic it stands first in the catalogue Infusion of roses made with it in the place of vitriolic acid is a valuable medicine

Acidum nitrosum Spiritus nitri fumans The nitrous acid possesses the same properties as the nitric, but in a much inferior degree

Acidum sulphuricum See *Acidum vitriolicum*

Acidum perlatum Perlate acid, or acid of pearls A preparation much vaunted formerly but now ascertained to be nothing more than phosphoric acid, separated by re-agents from human urine Morveau, however, like Bergman, thinking it a peculiar acid, named it in his Encyclopædia, "the diuretic or uretic acid

Acidum nitrosum dilutum Aqua fortis Diluted nitrous acid possesses the same properties as the nitrous acid, but in an inferior degree

Acidum vitrioli aromaticum Elixir vitrioli acidum A stimulant and stomachic preparation of the Edinburgh pharmacopœia, for which the London college has substituted the acidum vitriolicum dilutum

Acidum vitriolicum Vitriolic acid of the pharmacopœias, is termed acidum sulphuricum in the new chemical nomenclature It is highly esteemed as an antiseptic and antiphlogistic, and is therefore exhibited in synochus, cynanche, scrophula, &c See *Sulphuric acid*

Acidum vitriolicum dilutum The virtues of this preparation are the same as those of the acidum vitriolicum, only in a much inferior degree

ACIDIFIABLE BASE, or RADICAL, in chemistry, is any substance, whether simple or compound, that is capable of uniting with such a quantity of oxygen, as thereby to form an acid This union must take place without decomposing the base From our account of acids (see ACID), it will be seen that acids agree in containing oxygen but differ in their radicals, it is the radical, therefore, or the acidifiable base, that determines the species of acid and is employed at present to denote it. This mode of expression, however, is not general for instance, those acids which are called the benzoic, the succinic, and the sebacic, are not formed by the union of benzoin, amber, and fat with oxygen, as their names would indicate, but are really only part of those substances, and are separated from them by different processes The new chemical nomenclature has contributed very much to systematise and improve the language of chemistry its object is as much as possible to assign such names to bodies as shall clearly distinguish those that are simple and denote the composition of those that are compound, but it is not yet capable of a universal application in the instances adduced, the radicals of some of the acids are not known, and therefore the rules of the nomenclature could not be employed in the formation of their names, which are expressed by those of the substances in which the acids are found See NOMENCLATURE

ACIDIFICATION, the act or process of rendering any substance acid

ACIDITY The quality which constitutes a body acid, or that sensation of sharpness and sourness which acids excite upon the organs of taste

ACIDOTON In botany, a genus of the Linnean class and order monoecia hexandria, thus generically characterised Male, calyx five leaved, corolless, stamens numerous, fixed to a globular receptacle Female, calyx six-leaved, corolless, style three-cleft, capsule three grained It is a native of Jamaica, and but one species only has yet been explored

ACIDNESS See ACIDITY

ACIDULATED WATERS, generally called ACIDULÆ a species of mineral waters, which contain a considerable quantity of carbonic acid, and which are known by the poignancy of their taste, the sparkling appearance which they assume when shaken or poured from one vessel into another, and the faculty with which they boil

ACIDULOUS, a term used to denote any thing which is slightly acid.

ACIDULUM, in chemistry, a term expressing a genus of native salts, composed of acid salts, united with a certain quantity of potash, or those in which the alkaline base is supersaturated with acid. There are two species of acidulæ, the tartareous and the oxalic; the first, which is known by the name cream of tartar, will be described under the article ACIDULOUS TARTRITE OF POTASH: and the second, commonly called salt of sorrel, under ACIDULOUS OXALATE OF POTASH.

ACIDUM PINGUE, *Causticum*, in chemistry, an imaginary agent or principle, proposed by Frederic Meyer, an apothecary of Osnaburg, to explain the causticity of quick lime and other phenomena of chemistry. But as the operation of this principle is extremely confused, and the properties ascribed to it are often contradictory, it is now exploded. A further account of it may be seen in Macquer's Chemical Dictionary.

ACINACES, a kind of scymitar anciently used in Persia.

ACINACIFORM LEAF (*Folium acinaciforme*). In botany, fleshy, compressed, one edge convex and sharp, the other straighter and thicker, resembling a sabre, faulchion, or scymitar. As in Mesembryanthemum acinaciforme.

ACINI (ἄκινοι, from ἀκη, *a point*). In botany, clustering or granulating prominences in berries, as for instance those in the mulberry, or blackberry; also the kernels of the grape: and hence in anatomy applied to glands, which exhibit a similar configuration.

ACINIFORM TUNIC (*Tunica aciniformis*). The uvea, or posterior lamina of the iris, because in brutes, which the ancients chiefly dissected, it is of the colour of unripe grapes. See ACINI.

ACINODENDRON. American gooseberry. See MELASTOMA.

ACINOS. Wild or stone basil. See THYMUS.

ACIPENSER. In ichthyology, the sturgeon. The sixty-sixth genus of order VI or chondropterigious, in the Linnean class fishes. The following is its character: head obtuse, mouth beneath the head, retractile, without teeth; cirri between the end of the snout and the mouth; four apertures of the gills on each side; body elongated, angulate with numerous rows of large bony plates. The acipenser, or sturgeon, may be ranked among the larger fishes: is an inhabitant of the sea, but ascends rivers annually; its flesh, throughout all the species is delicious: from the roe is made caviare, and from the sound and muscular parts isinglass. It feeds on worms and other fishes. The female is larger than the male. It comprises five species: 1. a sturio (common sturgeon) (see NATURAL HISTORY, plate); 2. a schypa, 3. a ruthenus, 4. a stellatus, 5. a huso.

ACIS, in fabulous history, the son of Faunus and Smethesis, was a beautiful shepherd of Sicily, who being beloved by Galatea, Polyphemus the giant was so enraged, that he dashed out his brains against a rock: after which Galatea turned him into a river, which was called by his name.

ACIS (Ovid, Theocritus), a river of Sicily, running from a very cold spring, in the woody and shady foot of mount Ætna, eastward into, and not much above a mile from, the sea, along green and pleasant banks, with the speed of an arrow, from which some say it takes its name. It is now called Aci, Jaci, or Chiaci, according to the different Sicilian dialects. Anto one calls it Acius. Also the name of a hamlet at the mouth of the Acis.

ACLIDES, in Roman antiquity, a kind of missive weapon, with a thong fixed to it, whereby it might be drawn back again.

To ACKNOWLEDGE, *v. a.* 1. To own the knowledge of, to own any thing or person in a particular character (*Dryden*). 2. To confess, as a fault (*Psalms*). 3. To own, as a benefit (*Milton*).

ACKNOWLEDGING, *a.* (from *acknowledge*). Grateful (*Dryden*).

ACKNOWLEDGMENT, *s.* 1. Admission of any character in another (*Hale*). 2. Concession of the truth of any position (*Hooker*). 3. Confession of a fault. 4. Confession of a benefit received (*Dryden*). 5. Act of attestation to any concession, such as homage (*Spenser*). 6. Something given or done in confession of a benefit received (*Temple*).

ACKWORTH, a small village near Pontefract in Yorkshire, celebrated for the benevolent institution established there by the late Dr. Fothergill, at which more than 300 children of Quakers are educated under the same roof.

ACME, *s.* (ἀκμη, *Gr.*). The height of any thing; more especially used to denote the height or crisis of a distemper (*Quincy*).

ACNE (ἀχνη, *chaff*). A small tubercle covered with a branny scale.

ACNESTIS (ἀκνηστις, from α priv. and κναω, *to scratch*). That part of the spine between the shoulder-blades and the commencement of the loins. So called from the difficulty of reaching and scratching it.

ACNIDA, ACNIDE. Virginian hemp. A genus of the Linnean class and order diœcia pentandria; the male plant, calyx five-leaved, corolless. The female calyx two-leaved, corolless, styles five, one-seeded, covered with the succulent calyx. A single species alone is known to botanists, which is a native of the country whence it derives its English name.

ACOELIOUS (ακοιλιος, from α priv. and κοιλια, *the belly*). Thin, emaciated, bellyless.

ACOEMETÆ, or ACOEMETI, in church history, a set of monks who chanted the divine

service night and day in their places of worship. They divided themselves into three bodies, who alternately succeeded one another so that their churches were never silent. This practice they founded upon the precept, Pray without ceasing. They flourished in the East about the middle of the fifth century.

ACOLUTHI, or ACOLUTHISTS, in antiquity, an appellation given to those persons who were steady and immoveable in their resolutions, and hence the stoics, because they would not forsake their principles, acquired the title of Acoluthi. The word is Greek, and compounded of α priv. and κελευθος, way, as never turning from the original course.

ACOLUTHI, among the ancient Christians, implied a peculiar order of the inferior clergy in the Latin church. At their ordination, a taper was given them, thereby to understand, that they were appointed to light the candles of the church; as also an empty pitcher to imply that they were to furnish wine for the eucharist.

ACOLYTHIA, denotes the office or order of divine service, or the prayers, ceremonies, hymns, &c. of the Greek church.

ACON, an ancient instrument like the discus.

ACONDYLOUS (ακονδυλος, from α priv. and κονδυλος, *a joint*.) In botany, a term applied to a flower whose stalk is not divided by joints.

ACONITE. See ACONITUM.

ACONITE WINTER. See HELLEBORUS.

ACONITI, in antiquity, a term applied to some of the Athletæ. Its import is not now well known.

ACONITIFOLIUM (from *aconitum*, wolf's bane, and *folium*, a leaf.) Duck's-foot. A herb whose leaves resemble wolf's-bane.

ACONITUM (Dioscorides derives this word from α neg. ... *sharpen*, the herb having been used medicinally to quicken the sight. By others it is derived from ... priv. and ... *dust*, whence ... it being found to thrive in barren and rocky places.) Aconite: wolf's bane: Monk's-hood. A genus of the Linnean class polyandria, order trigynia. The common monk's hood, a. napellus, is a native of the mountainous and woody parts of Germany, France, and Switzerland, but is cultivated in our flower-gardens for the beauty of its colour, which is sometimes white, sometimes yellow, and sometimes blue, and like many other plants, is beautifully duplicated in its petals by such horticulture. Every part of it is strongly poisonous. The extract, or inspissated juice, is given in acute rheumatism, scrophula, and syphilis. Its virtues are sudorific and diuretic, generally however accompanied with vertigo, or giddiness of the head. It may be begun as a full dose at gr. 2, which should be gradually and cautiously augmented. The common character of the Linnéan genus aconitum, is calyx-less, five petalled, the uppermost marked; ... nectaried, peduncled, recurved; siliques three or five. There are fifteen known species.

ACONTIAS, a name used by some authors, for a sort of comet, or meteor, whose head appears round or oblong, and its tail very long, and slender, resembling a javelin.

ACONTIAS (ακοντιας, a swift meteor, from ακοντιζω, *to dart*.) The poisonous dart-snake, so called from its agility. Its flesh was formerly used as a restorative in medicine.

ACONTIUS, a youth of Cea, who, when he went to Delos to see the sacrifices of Diana, fell in love with Cydippe, a beautiful virgin, and being unable to obtain her, wrote verses on an apple, which he threw into her bosom. Cydippe read these verses, and being compelled by the oath she had inadvertently made, married Acontius. (*Ovid.*)

ACOR (from *aceo*, to be sharp.) Acidity in the stomach.

ACORIA (ακορια, from α neg. and κορεω, *to satisfy*.) Bulimia, addephagia. Ravenous, or canine appetite.

ACORNS. The fruit, or nut of trees of the oak kind.

ACORN, a little ornamental piece of wood, in the shape of a cone, fixed on the top of the spindle on the mast-head, above the vane, to keep it from coming off the spindle in a whirlwind.

ACORN-SHELL. In conchology. See LEPAS.

ACORUS (ακορον, from α neg. and κορεω, *to purify*.) The galangale, or fleur de lis. In medicine, formerly used as an astringent, and hence its name.

ACORUS CALAMUS. The systematic name for CALAMUS AROMATICUS, which see.

ACORUS PALUSTRIS. See GLADIOLUS LUTEAS.

ACORUS VERUS. The same as ACORUS CALAMUS.

ACORUS VULGARIS. The same as ACORUS PALUSTRIS.

ACORUS. Sweet-rush. A genus of the Linnean class, and order hexandria monogynia, thus generically characterized: spadix cylindrical, covered with florets, corol six-petalled, naked, styleless, capsule three celled. Two species of this plant have been detected, the a. calamus, vulgarly called sweet-flag, found in the pools of our own and other countries of the same latitude, the roots of which form the calamus aromaticus of the shops. And the a. gramineus, a native of China, and which has been cultivated in the royal garden at Kew. See CALAMUS AROMATICUS.

ACORYPHOUS (ακορυφος, from α neg. and κορυφη, *a head*.) In botany, applied to vegetables, which like the tendrils of a vine, terminate in a point, without head or flower.

ACOSMIA (from α neg. and κοσμιος, *beautiful*.) Ill health, as productive of loss of beauty.

ACOSMOUS (from *acosmia*.) Pale, thin;

bald; because the bald are supposed to have lost their greatest ornament.

ACOTYLEDON (ακοτυληδων, from α neg. and κοτυληδων, *a cotyledon*.) In botany, applied to seeds that are without cotyledons.

ACOTYLEDONOUS PLANTS (*Plantæ acotyledones.*) Without cotyledons or lobes to the seed, and consequently not having any seminal leaves, as in the class cryptogamia. The distinction of vegetables into acotyledons, monocotyledons, dicotyledons, and polycotyledons, or into such as have no lobes, one lobe, two lobes, or several in a seed, has been long made, and is the basis of Jussieu's natural arrangement. It is a doubt, however, whether any plant be strictly acotyledonous: those most suspected so, having been of late found possessed of one or more cotyledons upon more minute examination.

ACOUSMATICI, sometimes also called Acoustici, in Grecian antiquity, such of the disciples of Pythagoras as had not completed their five years probation.

ACOUSTIC, in general, denotes any thing that relates to the ear, or the doctrine of sounds.

ACOUSTIC VESSELS, in the ancient theatres, were a kind of vessels, made of brass shaped in the bell-fashion, which being of all tones within the pitch of the voice, or even of instruments, rendered the sounds more audible, so that the actors could be heard through all parts of the theatres, which were even 400 feet in diameter.

ACOUSTICS, the doctrine, or theory of hearing, or of sounds. The word is derived from the Greek ακουω, *audio*, to hear. The ancients seem to have considered sounds under no other point of view than that of music, that is to say, as affecting the ear in an agreeable manner. It is even very doubtful whether they were acquainted with any thing more than melody, and whether they had any art similar to that which we call composition. The moderns, by studying the philosophy of sounds so much neglected by the ancients, have given birth to a new science distinguished by the name of acoustics, which has for its object the nature of sounds, and treats also of the theory of hearing, and the best means of assisting that sense. This science is divided by some writers into diacoustics, which explains the properties of those sounds that come directly from the sonorous body to the ear, and catacoustics, which treats of reflected sounds; but such distinction does not appear to be of any real utility. Sturmius in his Elements of Universal Mechanics, treats of acoustics. After examining into the nature of sounds, he describes the several parts of the external and internal ear, and their several uses and connexions with each other, and from thence deduces the mechanism of hearing; and lastly, he treats of the means of adding an intensity of force to the voice and other sounds; and explains the nature of echoes, otacoustic tubes, and speaking trumpets. On many particulars connected with this science, opinions are still much divided, and there have not been made experiments sufficient to determine what is essential to the nature of a vehicle of sound, how it is transmitted, reflected, or destroyed, in many instances, or whether its velocity be uniform or variable. Thus, with respect to the vehicles of sound, as sounds have not been heard when the vibrating body has been struck in vacuo, it is manifest that air is a vehicle; yet we must not assert that it is the only vehicle, for water, metals, and almost all substances of any density or texture, will not only transmit sound, but even convey it more readily and perfectly than air, which is by no means a good vehicle. Fishes have a strong perception of sounds, even at the bottom of deep rivers. From hence, it would seem not to be very material in the propagation of sounds whether the fluid which conveys them be elastic or otherwise. One thing however is certain, that whether the medium be elastic or not, whatever sound we hear is produced by a stroke, which the sounding body makes against the fluid, whether air or water. The fluid being struck upon, carries the impression forward to the ear, and there produces its sensation. But the manner in which this conveyance is made, is still disputed; whether the sound be diffused into the air, in circle beyond circle, like the waves of water when we disturb the smoothness of its surface by dropping in a stone, or whether it travels along, like rays diffused from a centre, somewhat in the swift manner that electricity runs along a rod of iron, are questions which have greatly divided the learned. It must be observed, though, that some late experiments have tended much to remove the difficulties here alluded to, as will be seen under the proper articles in this work. See CHORD, ECHO, ELASTIC STRING, EAR, SOUND, TRANSMISSION, VELOCITY, VIBRATION, &c.

ACOUSTICS, is a name sometimes given to instruments or medicines which assist the hearing.

To ACQUAINT. *v. a.* (*accointer*, Fr.) 1. To make familiar with (*Davies*). 2. To inform (*Shakspeare*).

ACQUAINTANCE. *s.* (*accointance*, Fr.) 1. The state of being acquainted with, familiarity, knowledge (*Dryden. Atterbury*). 2. Familiar knowledge (*South*). 3. A slight or initial knowledge short of friendship (*Swift*). 4. The person with whom we are acquainted.

ACQUAINTED. *a.* Familiar, well known (*Shakspeare*).

ACQUEST, or ACQUIST, is understood in a legal sense, of goods or effects, not descended or held by inheritance, but acquired either by purchase or donation.

ACQUEST is also popularly used for conquest, or a place acquired by the sword.

To ACQUIESCE. *v. n.* (*acquiescer*, Fr. *acquiescere*, Lat.) To rest in, or remain satisfied with (*South*).

ACQUIESCENCE *s* (from *acquiesce*) 1. A silent appearance of content (*Clarendon*) 2. Satisfaction, rest, content (*Addison*) 3 Submission confidence (*South*)

ACQUIRABLE *a* (from *acquire*) That may be acquired, attainable (*Bentley*)

To ACQUIRE *v a* (*acquiro*, Lat) 1 To gain by one s labour or power (*Shakspeare*) 2 To come to; to attain (*Glanville*)

ACQUIRED *particip* (from *acquire*) Gained by one s self (*Locke*)

ACQUIREMENT *s* (from *acquire*) That which is acquired, gain, attainment (*Addison*)

ACQUIRER *s* (from *acquire*) The person that acquires a gainer

ACQUISITION *s* (*acquisitio* Lat) 1 The act of acquiring or gaining (*South*) 2 The thing gained, acquirement (*Denham*)

ACQUISITIVE *a* (*acquisitivus*, Lat) That is acquired or gained (*Wotton*)

ACQUIST *s* (See ACQUEST) Acquirement, attainment not in use (*Milton*)

To ACQUIT *v a* (*acquitter* Fr) 1 To set free (*Spenser*) 2 To clear from a charge of guilt, to absolve (*Dryden*) 3 To clear from any obligation (*Dryden*)

ACQUITMENT *s* (from *acquit*) The state of being acquitted, or act of acquitting (*South*)

ACQUITTAL, a discharge, deliverance, or setting free of a person from the guilt or suspicion of an offence Acquittal is of two kinds, in law, and in fact When two are appealed or indicted of felony, one as principal, the other as accessory, the principal being discharged, the accessory is by consequence, also freed in which case, as the accessory is acquitted by law, so is the principal in fact

ACQUITTANCE a discharge in writing for a sum of money that the party has paid No man is obliged to pay a sum of money, if, when he has provided a proper stamp, the demandant refuse to give an acquittance, which bars all actions

ACRA, or ACRE, on the coast of Phoenicia in Turkey Its ancient name was Ake, or Accho, as it is called in Scripture The Arabs call it Akka at this day The time of Asser were never able to drive the ancient inhabitants from this place This town was taken by the Saracens in 636 In 1104 the Christians became masters of it In 1187, Saladin, sultan of Egypt, got possession of it and in 1191, Philip, king of France and Richard, king of England, retook it, but in 1291, the Saracens assaulted and destroyed the fortifications, which they afterwards repaired It was taken from them by the Turks in 1517 This place was besieged during the late war by the army under Bonaparte, but defended by sir Sydney Smith, who here obtained signal honours by his bravery and magnanimity Lat 32 38 N Long 35 20 E

ACRÆ, in the ancient geography, a town of Sicily, whose inhabitants were called Acrenses It stood to the south of Syracuse, at the distance of twenty-four miles, near the place now called the monastery of Santa Maria d'Arcia, on an eminence, as appears from Silius Italicus The Syracusans were the founders of it, according to Thucydides, seventy years after the building of Syracuse, or 665 before Christ Hence the epithet Acræus

ACRA (Josephus), one of the hills of Jerusalem, on which stood the lower town, which was the Old Jerusalem, to which was afterwards added Zion or the city of David Probably called Acra from the fortress which Antiochus built there, in order to annoy the temple and which Simon Maccabæus took and razed to the ground

ACRA, ACRAI The period of menstruation Also the nymphomania, or furor uterinus

ACRACY (from ακρατεια from α neg and κρατος, *strength*) Weakness, impotency, debility, from relaxation or a lost tone of the

ACRASY (acrasia ακρασια, from α neg and κεραω, *to mix*) Intemperance, from the metaphor of wine unmixed, or untempered with water It applies to excess in eating, drinking or venery

ACRE is used in the dominions of the Mogul, in regard to his revenues, for the sum of 100,000 roupees, eight roupees being equal to about one pound sterling

ACRE, a quantity of land, containing four square roods, or 160 square poles or perches The word perhaps is formed from the Saxon accre or German acker field, of the Latin ager Salmasius derives it from acna, used for acena, a land measure among the ancients, containing 10 feet The length of the pole varies in different countries, and is called customary measure, the difference running from $16\frac{1}{2}$ feet (the statute length), to 28 The acre is also divided into 10 square chains, of 22 yards each, that is 4840 square yards An acre in Scotland contains four square roods, one square rood is 40 square falls, one square fall, 36 square ells, one square ell, nine square feet, and 73 square inches one square foot, 144 square inches The Scots acre is also divided into 10 square chains but the length of the Scots chain is to that of the English chain, as 8028 to 7920 So that the Scots acre is to the English acre, as 100,000 to 78,694 The French acre, arpent contains $1\frac{1}{4}$ English acre, or 55206 square English feet whereof the English acre contains only 43560 The Strasburg acre is about half an English acre The Welsh acre contains commonly two English ones The Irish acre is equal to one acre, two roods, nineteen perches $\frac{27}{121}$, English Sir William Petty, in his Political Arithmetic, reckons that England contains 39 millions of acres but Dr Grew, in Phil Trans No 330, computes that England contains not less than 46 millions of acres, whence he infers that it is above 46 times as large as the pro-

vince of Holland Mr Pitts Capper, in his Statistical Account of England and Wales, states the cultivated land at about 28 millions of acres, the uncultivated at more than 9 millions, and the whole at 37,20 , 655 acres This result corresponds nearly with Sir William Petty's

ACRE (ακρη, from ακρος, extreme) The tip of the nose, the extremity of any other organ

ACREA (the plural of Acre) Extremities, as the nose, arms, legs, &c

ACREDULA (ab acri cantu) The nightingale

ACRIBEIA, a term purely Greek, Ακριβεια, literally denoting an exquisite or delicate accuracy, it is sometimes used in our language for want of a word of equal significancy

ACRID (acridus, from acer, sharp) Of pungent taste, or penetrative heat, acrimonious

ACRIDOPHAGI, an Ethiopian people said to have fed on locusts as the name imports

ACRIFOLIUM (from acris, sharp and folium, a leaf) A plant with prickly leaves

ACRIMONIOUS a Abounding with acrimony sharp corrosive (Harvey)

ACRIMONY s (acrimonia, Lat) 1 Sharpness, corrosiveness (Bacon) 2 Sharpness of temper, severity (South)

ACRIMONY (acrimonia, from acris, acrid) In medicine, an erosive, irritative, or pungent power in medical substances, or the humours of the body in a state of pravity or disease

ACRIS (from ακρις, the top of a mountain) The sharp extremity of a fractured bone Also a locust

ACRISIUS, king of Argos, and brother of Praetus whom, after many dissensions he drove from Argos Acrisius had Danae by Eurydice daughter of Lacedaemon, and being told by an oracle, that his daughter's son would put him to death, he confined Danae in a brazen tower, to prevent her becoming a mother She however became pregnant by Jupiter, changed into a golden shower, and though Acriseus ordered her, and her infant called Perseus, to be exposed on the sea, yet they were saved, and Perseus soon after became so famous for his actions, that Acriseus, anxious to see so renowned a grandson, went to Larissa Here Perseus, wishing to shew his skill in throwing a quoit, killed an old man who proved to be his grandfather, whom he knew not In that, therefore, the oracle was fulfilled Acriseus reigned about thirty-one years

ACRISY (acrisia ακρισια, from α neg and κρινω, to judge) The state of a disease, in which the symptoms are indecisive of the event

ACRITOUS (acritus from the same as Acrisy) Uncertain, indecisive as to the event of a disease

ACRIVIOLA (from acris, pungent, and viola, the violet) The nasturtium Indicum, or Indian cress, so named from its pungency

ACROAMATIC, in an especial sense, denotes a thing sublime, profound, or abstruse. In which sense, it stands opposed to exoteric We say acroamatic philosophy, acroamatic theology an acroamatic method, acroamatic interpretation, &c

ACROAMATIC is sometimes also used in a more general sense for any thing kept secret, or remote from popular use

ACROASIS (ακροασις, from ακροαομαι, to hear) The sense of hearing

ACROATICS, a name given to Aristotle's lectures in the more difficult and nice parts of philosophy, to which none but his disciples and intimate friends were admitted, whereas the exoteric were public or open to all, but there are other differences The acroatic were set apart for the higher and more abstruse subjects the exoteric were employed in rhetorical and civil speculation Again, the acroatic were more subtle and exact, evidence and demonstration being here aimed at, the exoterics chiefly aimed at the probable and plausible The former were the subject of the mornings exercises in the Lyceum, the latter of the evening Add that the exoterics were published, whereas the acroatics were kept secret

ACROBATICA or ACROBATICUM, from ακρος, high and βαινω, or βαινω, I go an ancient engine, whereby people were raised aloft, that they might see more conveniently about them

ACROBYSTIA (ακροβυστια, from ακρον, the extremity and βυω to cover) The extremity of the prepuce the prepuce itself

ACROCHEIR (ακροχειρ, from ακρος, extreme and χειρ the hand) The wrist

ACROCHIRISMUS among the Greeks, a sort of gymnastic exercise in which the two combatants contended with their hands and fingers only

ACROCHORDON (ακροχορδων, from ακρον, the extremity, and χορδη, a string) A wart with a small pedicle, so that it seems to hang by a string

ACROCOLIA (from ακρον and κωλον) The extremities of animals, giblets, or pettitoe

ACROCORDUS In amphibiology, a genus of serpents, characterised by having its body covered with warty tubercles Of this genus there is only known one species, the a Javanicus or warted snake of Java, defined as follows brown beneath paler, the sides obscurely variegated with a whitish hue head somewhat flattened, hardly wider than the neck, body gradually thicker towards the middle, and suddenly contracting near the tail, which is short and slightly acuminate See Nat Hist pl It inhabits Java, chiefly among the pepper plantations, grows sometimes to seven feet long The warts, or prominences by means of a magnifying glass, appear to be convex, carinate scales, and the

smaller ones are furnished with two minuter prominences, one on each side of it

ACRODRYA (from ακρον, and δρυς, an oak) An acorn and hence any fruit having a hard rind or shell

ACROLENION, or ACROLENIUM (ακρωλενιον, from ακρον, the extremity, and ωλενη, the cubit) The olecranon, or upper extremity of the ulna

ACROMANIA (ακρομανια, from ακρο extreme, and μανια, madness) Incurable madness

ACROMION (ακρωμιον, from ακρον, and ωμος, the shoulder) The humeral process or extremity of the scapula

ACROMONOGRAMMATICUM, a kind of poem wherein every subsequent verse begins with the letter wherewith the immediately preceding one terminates

ACROMPHALION, or ACROMPHALIUM (ακρομφαλιον, from ακρος, and ομφαλος, the navel) A prominent or projecting navel

ACRONYCHAI, or ACRONYCAL, in astronomy, is applied to a star or planet, when it is opposite to the sun It is from the Greek ακρονυχος, the point or extremity of night because the star rose at sun set, or the beginning of night, and set at sun rise, or the end of night, and so it shone all the night The acronychal is one of the three Greek poetic risings and settings of the stars, and stands distinguished from cosmical and heliacal By means of which, for want of accurate instruments, and other observations, they might regulate the length of their year

ACRONYCTI, stars rising in the evening twilight

ACROPOLITA (George), a writer on the Byzantine history, was born at Constantinople, in 1220 He had a dispute at the age of twenty-one with a physician, concerning the eclipse of the sun, before the emperor John, who made him great logothete, or chancellor of the empire He was also sent on various embassies, and filled several important stations He died in 1282 His Chronicle of the Greek empire begins in 1203, and ends in 1261 It was printed at Paris in Greek and Latin in 1651, fol

ACROSPERMUM A genus of the Linnean class and order cryptogamia fungi, characterised as follows fungus quite simple, globular, sessile, spongy seed crowded, supplying the place of a bark There are four known species

ACROPOSTHIA (ακροποσθια from ακρον and ποσθη, the prepuce) The termination of the prepuce amputated in circumcision

ACROSS ad Athwart, laid over something so as to cross it (*Bacon*)

ACROSTICK s (from ακρος and στιχος, Gr) A poem in which the first letter of every line being taken makes up the name of the person or thing on which the poem is written Among ecclesiastical writers, acrostics denote the ends of verses of psalms, which the people sang by way of chorus, or response, to the precentor, or leader of the psalm This was called singing acrostics, acrostichia, which was a species of psalmody usual in the ancient church Acrostic in this sense, amounts to the same with hypopsalma, diapsalma, acroteleution, and ephymnion, which are all terms of the same signification Though an acrostic properly signifies the beginning of a verse, yet it is sometimes also used for the end or close of it, as by the author of the Constitutions, when he orders one to sing the hymns of David, and the people to sing after him the acrostics or ends of the verses

ACROSTICHUM Wall rue Forked fern A genus of the Linnean class and order cryptogamia filices, its fructification covering the whole surface of the frond, or fern-foliage, and without involucre There are about thirty species, which may be arranged under those with an undivided frond, with a frond divided, a pinnate frond, and a frond double-pinnate

ACROSTOLIUM, in antiquity, an ornament of the prow or forecastle of a ship, chiefly of war, sometimes shaped like a buckler, a helmet, or an animal, but more frequently turned circular or spiral

ACROTERIA (acroteria, ακρωτηρια, from ακρον, extreme) The extreme parts, as the hands, feet, ears, nose, &c

ACROTERIA, in architecture small pedestals, usually without base, anciently placed at the middle or two extremes of pediments or frontispieces, serving to support the statues, &c It also signifies the figures placed as ornaments on the tops of churches, and the sharp pinnacles that stand in ranges about flat buildings with rails and ballusters

ACRYDIUM In Fabricius, a tribe or family of the genus gryllus, or cricket, consisting of few individuals See GRYLLUS

To ACT *v n* (*ago, actum*, Lat) 1 To be in action, not to rest (*Pope*) 2 To perform the proper functions (*South*) 3 To practise arts or duties to conduct ones self (*Dryden*) 4 To produce effects in some passive subject (*Arbuthnot*)

To ACT *v a* 1 To bear a borrowed character, as a stage-player (*Pope*) 2 To counterfeit, to feign by action (*Dryden*) 3 To actuate, to put in motion, to regulate the movements (*South*)

ACT *s* (*actum*, Lat) 1 Something done, a deed, an exploit (*Shakspeare*) 2 Agency, the power of producing an effect (*Shakspeare*) 3 Action, the performance of exploits (*Dryden*) 4 The doing of some particular thing, a step taken, a purpose executed (*Shakspeare*) 5 A state of reality, effect (*Hooker*) 6 A part of a play during which the action proceeds without interruption (*Roscommon*) 7 A decree of a court of jus-

tice (*Shakspeare*) 8 Record of judicial proceedings (*Ayliffe*)

ACT, in the universities, signifies a thesis maintained in public by a candidate for a degree, or to show the capacity and proficiency of a student At Oxford, the time when masters or doctors complete their degrees is also called the act, which is held with great solemnity At Cambridge they call it the commencement

ACT OF FAITH, *Auto da fe*, in the Romish church, is a solemn day held by the inquisition, for the punishment of heretics, and the absolution of the innocent accused The auto da fe may be called the last act of the inquisitorial tragedy It is a kind of gaol delivery, appointed as oft as a competent number of prisoners in the inquisition are convicted of heresy, either by their own voluntary, or extorted confession, or on the evidence of certain witnesses The process is this in the morning they are brought into a great hall, where they have certain habits put on which they are to wear in the procession The procession is led up by Dominican friars, after which come the penitents, some with san benitos, and some without, according to the nature of their crimes, being all in black coats without sleeves, and bare footed, with a wax candle in their hands These are followed by the penitents who have narrowly escaped being burnt, who over their black coats have flames painted with their points turned downwards, Fuego revolto Next come the negative, and relapsed, who are to be burnt, having flames on their habits pointing upward After these come such as profess doctrines contrary to the faith of Rome, who besides flames pointing upwards, have each their picture painted on their breasts, with dogs, serpents, and devils all open-mouthed, about it After sentence is passed by the civil magistrate, they are immediately carried to the Ribera, the place of execution, where there are as many stakes set up as there are prisoners to be burnt, with a quantity of dry furze about them The stakes of the professed, that is, such as persist in their heresy, are about four yards high, having a small board towards the top for the prisoner to be seated on The negative and relapsed being first strangled and burnt, the professed mount their stakes by a ladder, and the Jesuits, after several repeated exhortations to be reconciled to the church, part with them, telling them they leave them to the devil, who is standing at their elbow to receive their souls and carry them into the flames of hell On this a great shout is raised, and the cry is, Let the dogs beards be made, which is done by thrusting flaming furzes fastened to long poles against their faces, till their faces are burnt to a coal, which is accompanied with the loudest acclamations of joy At last fire is set to the furze at the bottom of the stake, over which the professed are chained so high, that the top of the flame seldom reaches higher than the seat they sit on, so that they rather seem roasted than burnt There cannot be a more lamentable spectacle, the sufferers continually cry out, while they are able, Misericordia per amor de Dios, "Pity for the love of God!" yet is this horrid scene beheld by all sexes and ages, with transports of joy and satisfaction

ACT, in dramatic poetry, signifies a certain division, or part, of a play, designed to give some respite both to the actors and spectators The Romans were the first who divided their theatrical pieces into acts, and in the time of Horace, all regular and finished pieces were divided into five

ACT OF PARLIAMENT is a positive law, consisting of two parts, the words of the act, and its true sense and meaning, which being joined, make the law The words of acts of parliament should be taken in a lawful sense Cases of the same nature are within the intention, though without the letter, of the act, and some acts extend by equity to things not mentioned therein See PARLIAMENT

ACTA POPULI, among the Romans, were journals or registers of the daily occurrences, as assemblies, trials, executions buildings births, marriages, deaths &c of illustrious persons, and the like These were otherwise called acta publica and acta diurna, or simply acta The acta differed from annals, in that only the greater and more important matters were recorded in the latter, whilst those of less note appeared in the former

ACTÆA Bane-berry Herb Christopher A genus in the Linnéan class and order polyandria monogynia, thus characterised calyx four leaved, petals four, berry one celled, many-seeded, seeds flat There are four species, two of which are natives of Japan and China one (a racemosa) of North America, and one (a spicata) of the woods of our own country

ACTÆON, in fabulous history, the son of Aristæus and Autonoe, a great hunter He was turned by Diana into a stag, for looking on her while bathing, and died by his own dogs

ACTE, ACTÆ or ATTHIS, ancient names of Attica Pliny extends it to the isthmus of Corinth, so as to include Megaris Others make this last a distinct district because Megara was always the rival and enemy of the Athenians If so, then Attica was bounded on the west by Megara, on the north by Bœotia, separated from it by high mountains, through which there was a difficult passage, on the south by the Saronic bay, with the Egean sea on the east It was called Acte from its maritime situation, hence Actica and Attica and the epithets Actæus and Atticus (*Ovid*) Hence also Actias for Atheniensis (*Virgil*)

ACTIAN GAMES, in Roman antiquity, solemn games instituted by Augustus, in memory of his victory over Mark Anthony at

Actium, held every fifth year, and celebrated in honour of Apollo, since called Actius. Hence Actian years commenced at the battle of Actium, called the æra of Augustus.

ACTINIA. In zoology, the thirty fifth genus of order ii. or molusca, in the Linnean class worms. It is thus characterised: body oblong, cylindrical, fleshy, contractile, fixed by the base, mouth terminal, expansile, surrounded with numerous cirri, and without any other aperture. It is a marine, viviparous animal, with no aperture belonging to its body but the mouth; it feeds on shell fishes and other inhabitants of the sea, which it draws in through its tentacula, or feelers, in a short time rejecting through the same aperture, the shells and indigestible parts: it assumes various forms, and when the tentacles are all expanded, has the appearance of a full-blown flower. Many of the species are eatable, and some of them very sapid. Its known species are thirty-six, of which the more common are, 1. a. anemone, sea-anemony, 2. a. bellis, sea-daisy, 3. a. dianthus, sea carnation, 4. a. calendula, sea-marigold.

ACTINIA. In botany, a genus of the Linnéan class and order syngenesia polygamia superflua, thus characterised: receptacle naked, seeds crowned with a many-leaved chaff, the chaff awned, calyx many-leaved, equal. Of this genus only a single species is known, which was first described by Jussieu.

ACTINOLITE, GLASSY. In oryctology. See ACTINOTUS.

ACTINOTUS, ACTINOTE. In Gmellin's improved oryctologic system of Linnæus, which is that we shall chiefly adhere to in the present work, a genus of the class earths, and order talcose, as generically characterised: Consisting of carbonat of magnesia, a larger proportion of oxyd of iron, and the greatest part silex or silica (silicious earth): harsh to the touch, shining, rigid, fragile, prismatic, generally of a green colour, spontaneously falling into granular fragments, but breaking into indeterminate fragments; melting in the fire, with ebullition, into a pellucid six-coloured globule. There are three species: 1. A. fibrosus, found with pyrites in the mines of Saxony. 2. A. vulgaris, found in the iron mines of Sweden: the asbestoid of Kirwan: radiated schorl of Schmeisser. 3. A. vitreus, isle of Sky, Altemont in Dauphigne, and in the Tyrolese mountains. Glassy actinolite of Kirwan, vitreous striated schorl of Schmeisser. Malacolite of Thomson.

ACTION, in a general sense, denotes the operation of a power. The idea of action is so familiar to us, that a definition may as easily obscure as explain it. Some schoolmen, however, attempt to express its nature by "a manifestation of the power or energy of a substance; made either within, or without it." Thus, say they, when the mind acts, what does it more, than perceive a vital power exerting itself, as, in reality, the several actions of the mind are no other than so many indications of its vitality? Grammarians observe some distinction between action and act, the former being generally restricted to the common or ordinary transactions, whereas the latter is used to express those which are remarkable. Thus, we say it is a good action to comfort the unhappy; it is a generous act to deprive ourselves of what is necessary for their sake. The abbé Girard makes a further distinction between the words action and act. The former, according to him, has more relation to the power that acts than the latter, whereas the latter has more relation to the effect produced than the former: and hence the one is properly the attribute of the other. Thus we may properly say, "Be sure to preserve a presence of mind in all your actions, and take care that they are all acts of equity."

Dr Reid is of opinion that no being can be an agent, or perform an action, in the proper sense of the word, which does not possess, in some degree, the powers of will and understanding. If this opinion be just, it is obvious, that what are called the powers of nature, such as impulse, attraction, repulsion, electricity, &c. are not, strictly speaking, powers or causes, but the effects of the agency of some active and intelligent being, and that physical causes, to make use of common language, are nothing more than laws or rules, according to which the agent produces the effect. This doctrine has been very acutely controverted; we are, however, inclined to adopt it, and might proceed to a positive defence of it, were it not likely to lead us too great a length. We shall here consider an important question, the answer to which will, we think, go far towards removing all objections to Dr Reid's opinion. Can an agent operate where, either by itself or by an instrument, it is not present? We think not, because agency, or the exertion of power, must be the agency of something. The constitution of the human mind compels us to attribute every action to some being; but if a being could act in one place from which it is absent, it might do the same in a second, in a third, and in all places, and thus we should have action without an agent: for to be absent from all places is a phrase of the same import as not to exist. But if a living and intelligent being cannot act but where it is either immediately or instrumentally present, much less surely can we attribute events of any kind to the agency of an absent and inanimated body. Yet it has been said, that "we have every reason which the nature of the subject and of our own faculties can admit of, to believe, that there are among things inanimate such relations, that they may be mutually causes or principles of change to one another, without any exertion of power, or any operation of an agent, strictly so called. Such relations, for aught that we know, may take place among bodies at great distances from

one another, as well as among bodies really or seemingly in actual contact, and they may vary both in degree and in kind, according to the distances between the bodies. That any thing should be a cause or principle of change to another, without the exertion of power or the operation of an agent, appears to us a palpable contradiction, and we could as easily conceive any two sides of a triangle to be not greater than the third side, as reconcile such a proposition to that faculty of our minds by which we distinguish truth from falsehood. When we see one body the apparent cause of change in another body, we cannot possibly entertain a doubt of the exertion of power, but whether that power be in the body apparently producing the change, or in a distinct agent, is a question to which an answer will not so readily be found. That it is in a distinct agent, we are strongly inclined to believe, not only by the received doctrine concerning the inertia of matter, which, though it has been frequently controverted, we have never seen disproved, but much more by considering the import of an observation frequently introduced to prove the direct contrary of our belief. 'We cannot be charged (says the writer whom we have just quoted) with maintaining the absurdity, that there may be an effect without a cause, when we refer the fall of a stone to the ground, and the ebbing and flowing of the sea, to the influence of the earth on the stone, and of the sun and moon on the ocean, according to the principle of general gravitation.' We admit the truth of this observation, provided the influence of the sun and moon on the ocean be possible; but, to us at least, it appears impossible, and is certainly inconceivable. The influence of the sun and moon can here mean nothing but the action or operation of the sun and moon; but if these two bodies be inanimate, they cannot act at all, in the proper sense of the word; and whatever they be, it is obvious that they cannot act immediately on an object at such a distance from them as the earth and the ocean. If they be the agents, they must operate by an instrument, as we do when moving objects to which our hands cannot reach; but as it may be shown that neither air, nor æther, nor any other material instrument which has yet been thought of, is sufficient to account for the phenomena of attraction and repulsion, it is surely much more rational to conclude, that the ebbing and flowing of the sea are produced, not by the influence of the sun and moon, but by the power of some distinct agent or agents. What those agents are, we pretend not to say. If the Supreme Being himself be the immediate author of every change which takes place in the corporeal world, it is obvious that he acts by fixed rules, of which many are apparent to the most heedless observer, whilst the discovery of others is reserved for the reward of the judicious application of the faculties which he has given us. If he employ inferior agents to carry on the great operations of nature, it is surely not difficult to conceive that the powers of those agents which were derived from him, may by him be restrained within certain limits, and their exercise regulated by determined laws, in such a manner as to make them produce the greatest benefit to the whole creation. Nor let it be thought an objection to this theory, that the changes which take place among bodies at great distances from each other, vary both in degree and in kind according to the distances; for this variation, which we acknowledge to be a fact, appears to us wholly unaccountable upon any other hypothesis than that which attributes the different changes to agents distinct from the bodies themselves. Did we perceive all the particles of matter, at all distances, tending towards each other by a fixed law, we might be led to consider mutual attraction as an essential property of that substance, and think no more of inquiring into its cause, than we think of inquiring into the cause of extension. But when we find that the same particles, which at one distance seem to attract each other, are at a different distance kept asunder by a power of repulsion, which no force, with which we are acquainted, is able to overcome, we cannot attribute the principle or cause of these changes to brute matter, but must refer it to some other agent exerting power according to a fixed law. Sup. Ency. Brit. On the whole, we conceive, the candid enquirer after truth will, after careful reflection, see abundant reason to reject that philosophy which would exclude the agency of mind from the universe, and be induced to refer real agency to mind alone; yet as we are aware that our grand object in this work should be to give a concise and accurate account of sciences as they are, and of principles as they are most generally adopted, we hope we shall be excused if we are not so frequently combating the erroneous notions of merely mechanical philosophers, as our inclination, were we to consult that alone, might lead us to attempt.

Action, in ethics, or moral action, is a voluntary motion of a creature capable of distinguishing good and evil, whose effect, therefore, may be justly imputed to the agent. A moral action may be more fully defined to be whatever a man, considered as endued with the powers of understanding and willing, with respect to the end he ought to aim at, and the rule he is to regard in acting, resolves, thinks, does, or even omits to do, in such a manner as to become accountable for what is thus done or omitted, and the consequences thereof. In the strict philosophical sense, says Dr. Reid (Essays on the Active Powers of Man, p. 97), nothing can be called the action of a man, but what he previously conceived, and willed or determined to do. In morals the word is commonly employed in this sense, nor is any thing imputed to a man as his doing in which his will was not interposed. The foundation, then, of the morality of actions is, that they are done knowingly and voluntarily; and all moral actions may be

divided, with respect to the rule, into good and evil.

Action, in mechanics or physics, a term used to denote, sometimes the effort which some body or power exerts against another body or power, and sometimes it denotes the effects resulting from such effort. It is one of the laws of nature, that action and re-action are always equal, and in contrary directions. Indeed it is not only a law of nature, but, if we may so speak, a law of human thought: the contrary would imply a contradiction. We cannot conceive action between the parts of matter without an equal re-action: for, if the action were greater than the re-action, the excess of that action would be against nothing, that is, it would not be action, which is a contradiction. And, if the re-action were greater, the excess would be without a cause, which once admitted, nothing can be denied. If a body be urged at the same time by equal and contrary actions, it will remain at rest. But if one of these actions be greater than its opposite, motion will ensue towards the part least urged. The actions of bodies upon each other, in a space that is carried uniformly forward, are the same as if the space were at rest; and any powers or forces that act upon all bodies, so as to produce equal velocities in them in the same, or in parallel right lines, have no effect on their mutual actions, or relative motions. Thus the motion of bodies on board of a ship that is carried uniformly forward, are performed in the same manner as if the ship was at rest. And the motion of the earth about its axis has no effect on the actions of bodies and agents at its surface, except in so far as it is not uniform and rectilineal. In general, the actions of bodies upon each other, depend not on their absolute, but relative motion.

Quantity of Action, in mechanics, a name given by M. de Maupertuis, in the Memoirs of the Academy of Sciences of Paris for 1744, and in those of Berlin for 1746, to the continual product of the mass of a body, by the space which it runs through, and by its celerity. He lays it down as a general law, that in the changes made in the state of a body, the quantity of action necessary to produce such change is the least possible. This principle he applies to the investigation of the laws of refraction, and even the laws of rest, as he calls them, that is, of the equilibrium or equipollency of pressures, and even to the modes of acting of the Supreme Being. In this way Maupertuis attempts to connect the metaphysics of final causes with the fundamental truths of mechanics, to shew the dependence of the collision of both elastic and hard bodies, upon one and the same law, which before had always been referred to separate laws, and to reduce the laws of motion, and those of equilibrium, to one and the same principle. This ingenious geometer, finding the symbol MVS (or the quantity of matter, multiplied by the velocity and by the distance run over during the action) always present itself to him as a mathematical minimum in the actions of bodies on each other, he was amused by the observation, and presumed that there was some reason for it in the nature of things. Finding that it gave him very neat solutions of many elementary problems in dynamics, he thought of trying whether it would assist him in accounting for the constant ratio of the sines of incidence and refraction; he found that it gave an immediate and very neat solution. This problem had, before his time, occupied the minds of Des Cartes and Fermat. Each of these gentlemen solved the problem by saying, that the light did not take the shortest way from a point in the air to a point under water, but the easiest way, in conformity with the acknowledged economy of nature and consummate wisdom of its adorable Author. But how was this the easiest way, the course that economised the labour of nature? One of these gentlemen proved it to be so, if light move faster in air than in water: the other proved it to be so, if light move faster in water than in air. Both could not be right. Maupertuis was convinced that he had discovered what it was that nature was so chary of, and grudged to waste—it was MVS! Therefore MVS can mean nothing but labour, nothing but natural exertion, mechanical action; therefore MVS is the proper measure of action. He kept this great discovery a profound secret, and, being president of the Royal Academy of Berlin, he proposed for the annual prize question "Are the laws of motion necessary or contingent truths?" He could not compete for the prize by the laws of the academy, but before the time of decision, he published at Paris his dissertation on the principle of the least action, in which he pointed out the singular fact of MVS being always a minimum, and therefore, in fact, the object of nature's economical care. He solved a number of problems by making the minimum state of $\frac{f\,v\,s}{m}$ a condition of the problem; and to crown the whole, shewed that the laws of motion which obtain in the universe could not be but what they are, because this economy was worthy of infinite wisdom, and therefore any other laws were impossible. The reputation of Maupertuis was already established as a good mathematician and a worthy and amiable man, and he was a favourite of Frederic. The principle of least action became a mode, and it drew attention for some time, till it went out of fashion. It is no mechanical principle, but a necessary mathematical truth, as any person must see who recollects that v is the same with s, and that f is the same with mv. See Force, Motion, &c.

Action of the Mouth. In the manege, signifies the agitation of the tongue and mandible of a horse, or his champing upon the bit of his bridle, to keep his mouth fresh, whereby he emits a white ropy foam, which is in general looked on as a sign of health and vigour.

ACTION, in the manage, implies the full and proportioned use of the muscles of a horse, directed to the point he has in view, whether of draught, carriage, or mere speed; in which no power is idly expended, nor suffered to lie dormant. This is often in a considerable degree the gift of nature, but far more frequently the result of a long series of training. Every one perceives that the cause of progression is by no means the same in all animals. How different, for example, is the gallop of a large dray-horse, from that of a good race-horse! It is with difficulty that the former moves his body to determine it into the pace required. He gathers the ground heavily under him at every step, and the advance of his bulk is hardly effected. The latter, on the contrary, flies as an arrow from a bow, and scarcely imprints the ground with his shoe, running often over a space of four miles in less than eight minutes. Yet these are but individuals of one and the same genus. The number of the parts which conspire to effect their respective progression is the same in each; but these parts differ naturally in their bulk and extent, and artificially in their direction; whence result different degrees of power in the levers which they form. In the speed or progression of the horse, the hock is uniformly admitted to be the part whose function is of chief consequence. A good judge will always prefer that which is wide and flat, as externally appearing to denote strength; and this external appearance is readily confirmed by dissection.

ACTION, in the military art, an engagement between two armies, or different bodies of troops. It is also used to signify some memorable act performed by some officer or commander.

ACTION, in law, the right of demanding in a legal manner what is any man's due; or the process brought for recovering the same.

ACTIONS are either criminal or civil.

Criminal actions are to have judgment of death, as murder, robbery, &c. or only judgment for damage to the injured, fine to the king, and imprisonment. Under the head of criminal actions may also be ranked penal actions, which lie for some penalty or punishment, on the party sued, whether it be corporal or pecuniary. Also actions upon the statute, brought on breach of any statute or act of parliament, by which an action is given that did not lie before; as where a person commits perjury to the prejudice of another, the injured shall have an action upon the statute. And lastly, popular actions, so called because any person may bring them on behalf of himself and the crown, by information, &c. for the breach of some penal statute.

Civil actions are divided into real, personal, and mixt. Real action is that whereby a man claims a title, lands, tenements, &c. in fee, or for life; and this action is either possessory or ancestral; possessory, where the land are in a person's own possession or seisin; ancestral, when they were in the possession or seisin of his ancestors. Personal action, is that brought by one man against another, upon any contract for money or goods, or on account of trespass, or other offence committed; and thereby the debt, goods, chattels, &c. claimed. Mixt action, one lying as well for the thing demanded as against the person who has it, and on which the thing is recovered with damages for the wrong sustained; such is an action of waste sued against a tenant for life, the place wasted being recoverable, with treble damages, for the wrong done. All actions seem to be temporary. A real action may be prescribed against in five years after a fine levied, or recovery suffered. Writs of formedon for any title to lands in being, must be sued out within twenty years. Actions of debt, account, detinue, trover, and trespass, are to be brought within six years; of assault and battery within four years; and of slander within two years, after cause of action, and not afterwards. However, it ought to be observed, that the right of action in these cases is saved to infants, feme coverts, and persons in prison, or beyond sea, &c. so as they commence their suits within the time limited after their imperfections are removed. Actions may be brought against all persons whatever; but those who are attainted of high treason or felony, or outlawed, or excommunicated persons, &c. cannot bring any action till pardoned, absolved, &c. A feme covert must sue with her husband, and infants by their guardians. Action upon the case, is a general action which lies for the redress of wrongs and injuries done without force, and which by law are not provided against. This at present is the most frequent of all actions; being brought in all cases, where no certain form has been established; and the reason why it is called an action upon the case, is because the whole cause or case is set forth in the writ. It may be brought as well where there is another action, as where no other lies. Action upon the case for words, is brought when a person is injured in his reputation, and for words which affect the life, office, trade, &c. or tend to the loss of preferment in marriage, or otherwise, or to the disinheritance or other damage of a person. Action of a writ, is when a person pleads some matter by which is shewn, that the plaintiff had no cause to have the writ brought, though, perhaps he may have another writ for the same matter. It is hence called a plea to the action of the writ, in contradistinction from a plea to the action.

ACTION, in oratory, is an accommodation of the person of the orator to his subject; or, a management of the countenance, voice, and gesture, suited to the matter spoken or delivered.

Action makes one of the greatest branches or divisions of rhetoric. The ancients usually call it pronunciation.

Action is a collateral or secondary method of expressing our ideas, and is susceptible of a kind of eloquence as well as the primary. In the infancy of language, when words were few, or not easily connected, men would natu-

rally recur to action for explaining and expressing their conceptions, and they would labour to make themselves understood, by varying their tones of voice, and accompanying their tones with the most significant gesticulations. At this day, when persons speak in a language which they possess imperfectly, they have recourse to all these supplemental methods, in order to render themselves more intelligible. Besides, in the gradual improvement and extension of language, a warm imagination would introduce into discourse a variety of tones, and a considerable degree of action. Thus Dr Warburton accounts for so much speaking by action, as we find among the Old Testament prophets. Among the northern American tribes certain motions and actions are adopted in order to explain their meaning on all great occasions of intercourse with one another. The Chinese find it more easy to express different ideas by a variety of tones than to contrive words for all their ideas. The Greek and Roman languages also were pronounced with more numerous inflexions of voice and more animated gestures than any to which we are accustomed. Accordingly we find, that action was treated of by all the ancient critics as the chief quality in every public speaker; and the orators and players of Greece and Rome were distinguished by the vehemence of their action. This is, in all cases, an address to the external senses, which it endeavours to move and bring into its party by well-concerted motion and modulation, at the same time that the reason and understanding are attacked by force of argument. Accordingly, Tully very pertinently calls it *sermo corporis, the discourse of the body*; and *corporis eloquentia, the eloquence of the body*. The Roman mimics and pantomimes, we read, had such a compass even of mute action, that voice and language seemed useless to them: they could make themselves understood to people of all nations; and Roscius, the comedian, is particularly famed, as being able to express any sentence by his gestures, as significantly and variously as Cicero with all his oratory. Quinctilian gives us a system of the rules of action, taken not only from the writings of the ancient orators, but from the best examples of the forum. What we usually attribute to eloquence, was really the effect of the action only, as some of the greatest masters in that way have frankly acknowledged. Demosthenes expressly calls it, "the beginning, the middle, and the end of the orator's office;" and Cicero professes, "that it is not of so much importance what the orator says, as how he says it." The Greeks, who were attentive to multiply the means of influencing the passions, omitted nothing which might bring to perfection this first language of nature. Poetry and music were always supported by the action of the performers. This action was acquired by a kind of dance that regulated the motions and different inflexions of the body, animated the discourses of their orators, and sometimes the lessons of their philosophers. See Plut. in Demosth. tom. i. p. 851. ed. Xyland. Id. in x. Rhet. Vit. tom. ii. p. 845. Plato de leg. l. vii. tom. ii. p. 816. ed. Serran. Athen. Deipn. l. i. c. 17. p. 21. ed. Casaub. Austin on Action, &c. The modern civilised nations are much more cautious and moderate in the use of action than the ancients were: indeed they are approaching so rapidly to the opposite extreme, that it is now made a question by many, whether action ought to be practised and encouraged at all? For our own parts, however, we doubt not, that moderate, judicious action, may be highly useful, if accompanied with suitable arguments and address. There is no nation, nor hardly any persons, so phlegmatic, and destitute of feeling, as not to accompany their words with some actions and gesticulations, whenever they are much in earnest: it would, therefore, be unnatural in a public speaker, and inconsistent with that earnestness and ardour which he ought to manifest in affairs of moment, to remain motionless like a statue, and let the words drop frigidly from his mouth, without any extraneous assistance from graceful gesticulation. Action, properly conducted, gives to the speaker, whether in the senate, at the bar, or in the pulpit, very great advantages in enforcing his arguments, and impressing an audience: we conclude, therefore, with the advice which Shakspeare puts into the mouth of Hamlet: "Suit the action to the word, and the word to the action; with this special observance, that you o'erstep not the modesty of nature."

ACTION, in a theatrical sense, is nearly the same with that among orators, with this difference, that the actor adapts his action to an assumed character, whereas the orator is supposed, in reality, to feel the passion which his action expresses, whether joy, or grief, &c. See DECLAMATION.

ACTION, in poetry, is an event either real or imaginary, which makes the subject of an epic or dramatic poem. This, says Aristotle (De Poet. cap. vi. p. 657.), is the soul of tragedy. The action of a poem coincides nearly with the fable thereof, it being the usual practice not to take any real transaction of history, but to feign or invent one, or at least to alter the historical fact, so as to render it in a good measure fictitious. Critics consider the principal action, commonly called the fable, and the incidental action, or episode. F. Bossu has two chapters of real actions, the recitals whereof are fables, and of feigned actions, the recitals whereof are historical. The critics lay down four qualifications as necessary to the epic and tragic action: the first, unity; the second, integrity; the third, importance; and the fourth, duration; to which some add a fifth, viz. continuity. Dr Blair specifies three properties, which are essential to the action or subject of an epic poem. It must be one, great, and interesting. Aristotle insists upon unity, as essential to epic poetry; and he observes, that, in order to render this unity more sensible to the imagination, and

thus to give it a better effect it is not sufficient for the poet to confine himself to the actions of one man, or to those which happened during a certain period of time, but the unity must lie in the subject itself, and arise from all the parts combining into one whole This unity of action is sufficiently apparent in all the great epic poems Thus, Virgil has chosen for his subject the establishment of Æneas in Italy, which he keeps constantly in view, and which serves to connect all the parts The unity of the Odyssey is of the same nature, the return and re establishment of Ulysses in his own country The subject of Tasso is the recovery of Jerusalem from the Infidels, that of Milton, the expulsion of our first parents from paradise, and both of them are unexceptionable in the unity of the story The anger of Achilles, with its consequences, is the professed subject of the Iliad, but, as Achilles is in many books of the poem kept out of sight, and the fancy terminates on no other object than the success of the two armies that are seen contending in war, the unity is not so sensible to the imagination as in the Æneid This unity of the epic action does not exclude all episodes, or subordinate action Moreover, the unity of the epic action necessarily supposes that the action be entire and complete, or, as Aristotle expresses it, that it should have a beginning, middle, and end If the three parts of a whole seem to be generally denoted by the words, beginning, middle, and end, Bossu interprets them more expressly thus the causes and designs of a man's doing an action are the beginning the effects of those causes, and the difficulties occurring in the execution of those designs, are the middle of it, and the unravelling and extricating of those difficulties, are the end of the action

ACTIONABLE *a* (from *action*) That admits an action in law, punishable (*Howel*)

ACTIONARY, or ACTIONIST *a* proprietor of stock in a trading company a share in such a company being formerly called an action

ACTION-TAKING *a* Litigious (*Shakspeare*)

ACTITATION *s* (from *actito*, Lat) Action quick and frequent

To ACTIVATE *v a* (from *active*) To make active (*Bacon*)

ACTIVE *a* (*activus*, Lat) 1 That has the power or quality of acting (*Newton*) 2 That which acts, opposed to passive (*Donne*) 3 Busy, engaged in action (*Denham*) 4 Practical, not merely theoretical (*Hooker*) 5 Nimble agile, quick (*Dryden*)

ACTIVE, in grammar, is applied to such words as express action, and is therefore opposed to passive The active performs the action, as the passive receives it Thus we say, a verb active, a conjugation active, &c or, an active participle

ACTIVE VERBS, are such as do not only signify doing, or acting, but have also nouns following them, to be the subject of the action or impression thus, to love, to teach, are verbs active, because we can say, to love a thing, to teach a man Neuter verbs also denote an action, but are distinguished from active verbs, in that they cannot have a noun following them such are, to sleep, to go, &c Some grammarians, however, make three kinds of active verbs the transitive, where the action passes into a subject different from the agent, reflected, where the action returns upon the agent, and reciprocal where the action turns mutually upon the two agents who produced it

ACTIVELY *ad* (from *active*) Busily, nimbly

ACTIVENESS *s* (from *active*) Quickness, nimbleness (*Wilkins*)

ACTIVITY *s* (from *active*) The quality of being active (*Bacon*)

Sphere of Activity is the space which surrounds a body, as far as its efficacy or virtue seems to extend to produce any sensible effect Thus we say the sphere of activity of a loadstone, of an electric body, &c With regard to chemical affinity its action extends indefinitely about each molecule of a body But as it diminishes very rapidly, so that beyond a very small distance it ceases to be appreciable, we regard it as nothing at that term, and call sensible sphere of activity that whose centre is confounded with that of the particle, and whose radius is equal to the distance just mentioned

ACTIUM, a town and promontory of Epirus famous for the naval victory which Augustus obtained over Antony and Cleopatra, the 2d of September, B C 31, in honour of which the conqueror built there the town of Nicopolis and instituted games

ACTIUS is a name of Apollo, from Actium, where he had a temple Virgil

ACTIUS NAVIUS, an augur who cut a whetstone in two with a razor, before Tarquin and the Roman people, to convince them of his skill as an augur

ACTON East and West, two villages in Middlesex about [illegible] miles from London East Acton is celebrated for its medicinal wells

ACTON BURNEL, a village in Shropshire, three miles from Great Wenlock A parliament was held here in the reign of King Edward I when the famous act called Statute Merchant was renewed

ACTOR *s* (*actor*, Lat) 1 He that acts, or performs any thing (*Bacon*) 2 He that personates a character, a stage player (*Ben Jonson*) The drama in its original, only consisted of a simple chorus who sung hymns in honour of Bacchus, so that the primitive actors were no more than singers and musicians Thespis was the first who took upon him to introduce a persona, or actor, who was to ease the chorus by reciting the adventures of some of the heroes Thus came the recitation or declamation in use Æschylus, finding a single person tiresome, thought to entertain the audience more agreeably by the introduction of a second person, who should con-

2

verse and conduct dialogues with the first He likewise dressed his actors more decently than they had been before, and put on them the buskin and the mask Sophocles, finding the two persons of Æschylus too few for the variety of incidents, added a third, and here the Greeks stopped at least, we seldom find in any of their tragedies above three persons in the same scene They might probably think it wrong to admit more than three speakers at the same time on the stage, a rule which Horace has expressed in the following verse of his Art Poet

—"Nec quarta loqui persona laboret

In their comedies they took a greater liberty The moderns have introduced a much greater number of actors upon the stage This heightens the trouble and distress that should reign there, and makes a diversity in which the spectator is sure to be interested

ACTRESS s (actrice, Fr) 1 She that performs any thing (Addison) 2 A woman that plays on the stage Actresses, or female actors, were unknown to the ancients among whom men always performed the female characters, and hence one reason for the use of masks among them In England it is well known, that for many years after the time of Shakspeare, female characters were represented by boys or young men Sir William D Avenant in imitation of the foreign theatre first introduced females in the scene and Mrs Betterton is said to have been the first woman that appeared on the English stage Andrew Pennycuitre played the part of Matilda in a tragedy of Davenport, in 16 , and Mr Kynaston acted several female parts after the Restoration Downes, a contemporary of his, assures us that being then very young, he made a complete stage beauty performing his parts so well particularly Arthiope and Aglaura, that it has since been disputable among the judicious whether any woman that succeeded him touched the audience so sensibly as Kynaston did

ACTS OF THE APOSTLES, a canonical book of the New Testament, which contains great part of the lives of St Peter and St Paul, commencing at the ascension of our Saviour, and continued down to St Paul's arrival at Rome, after his appeal to Cæsar, comprehending in all about thirty years St Luke has been generally taken for the author of this book, and his principal design in writing it was to obviate the false acts, and false histories, which began to be dispersed up and down the world The exact time of his writing it is not known, but it must have been at least two years after St Paul's arrival at Rome because it informs us that St Paul dwelt two whole years in his own hired house perhaps he wrote it while he remained with St Paul, during the time of his imprisonment The council of Laodicea places the Acts of the Apostles among the canonical books, and all churches have acknowledged it as such without any controversy There were several spurious Acts of the Apostles, particularly, 1 Acts supposed to be written by Abdias, the pretended bishop of Babylon, who gave out that he was ordained bishop by the apostles themselves when they were upon their journey into Persia 2 The Acts of St Peter this book came originally from the school of the Ebionites 3 The Acts of St Paul, which is entirely lost Eusebius, who had seen it, pronounces it of no authority 4 The Acts of St John the Evangelist, a book made use of by the Encratites, Manichæans, and Priscillianists 5 The Acts of St Andrew, received by the Manichæans, Encratites, and Apotactics 6 The Acts of St Thomas the Apostle, received particularly by the Manichæans 7 The Acts of St Philip this book the Gnostics made use of 8 The Acts of St Matthias Some have imagined, that the Jews for a long time had concealed the original acts of the life and death of St Matthias, written in Hebrew, and that a monk of the abbey of St Matthias at Treves, having got them out of their hands, procured them to be translated into Latin and published them But the critics will not allow them to be authentic (See CANON) The truth and divine original of Christianity, may be deduced from a comparison of the Acts of the Apostles, with the other received books of the New Testament To this end Dr Paley has in his very masterly work, entitled Horæ Paulinæ brought together from the Acts of the Apostles and from the different Epistles of Paul, such passages as furnish proof of undesigned coincidence and which therefore, are so many independent proofs of the authenticity of both the Acts and those Epistles

ACTUAL a (actuel, Fr) 1 That which comprises action (*Shakspeare*) 2 Really in act not merely potential (*Milton*) 3 In act not purely in speculation (*Dryden*)

ACTUAL (actualis) This word is applied to any thing endued with a property or virtue which acts by an immediate power inherent in it it is the reverse of potential, thus a red hot iron or fire is called an actual cautery, in contradistinction from caustic which are called potential cauteries Boiling water is actually hot, brandy producing heat in the body is potentially hot though of itself cold

ACTUALITY s (from *actual*) The state of being actual (*Cheyne*)

ACTUALLY *ad* (from *actual*) In act in effect, really (*South*)

ACTUALNESS s (from *actual*) The quality of being actual

ACTUARY s (*actuarius* Lat) The register, or officer, who compiles the minutes of the proceedings of a court (*Ayliffe*)

To ACTUATE *v a* (from *ago, actum*, Lat) To put into action (*Addison*)

ACTUATE *a* (from the verb) Put into action, brought into effect (*South*)

ACTUOSE *a* (from *act*) That has strong powers of action

ACTUS, in the ancient agriculture the length of one furrow, or as far as a plough goes before it turns Plin lib xviii cap 3

Actus minimus, was a quantity of land 120 feet in length and four in breadth.

Actus major, or **Actus quadratus**, a square piece of ground, whose side was equal to 120 feet.

Actus intervicinalis, a space of ground four feet in breadth, left between the lands as a path or foot-way.

ACUANITES, called more frequently Manichees. They took their name from Acua, a disciple of Thomas the apostle.

ACUBENE, in astronomy, the star marked α in Cancer.

ACULEATE. *a.* (*aculeatus*, Lat.) That has a point or sting; prickly.

ACULEI. *s.* The prickles of animals, or of plants.

ACULEOUS. *a.* See Aculeate.

ACULER, a French word frequently made use of in the academies, signifying that a horse when working upon volts, does not go far enough forwards at each motion, so that his shoulders embrace or take in too little ground, and his croup comes too near the centre of the volt.

ACUMEN, οξυτης, in the ancient music, was used to signify a sound produced by the intention, or raising of the voice. This word is now commonly applied to sharpness, or quickness of intellect.

Acumen. (from *acuo*, to sharpen.) A sharp point. In anatomy, the pointed protuberance of various bones.

ACUMINATED. *part.* Ending in a point, sharp-pointed.

ACUPUNCTURE, the name of a surgical operation among the Chinese and Japanese, performed by pricking the part affected with a silver needle to excite inflammation. They employ this in head-aches, convulsions, colics, &c.

ACUPSOUS (ακυπρις, from α neg. and Κυπρις, Venus.) Chaste, unaddicted to venery.

ACUSTIC (*acusticus*, ακουστικος, from ακουω, *to hear.*) Acoustic, appertaining to the sense of hearing.

ACUTE, sharp. Acutus. In botany, ending in an acute angle. Applied to leaves and to the perianth, as in primula, &c.

Acute. *a.* (*acutus*, Lat.) 1. Sharp, opposed to blunt (*Locke*). 2. Ingenious, opposed to stupid (*Locke*). 3. Vigorous, powerful in operation (*Locke*).

Acute accent. See Accent.

Acute angle, in geometry, is that which is less than a right angle, or does not subtend 90 degrees.

Acute-angled triangle, is a triangle whose three angles are all acute. Every triangle must have, at least, two acute angles.

Acute-angled cone, is that whose opposite sides make an acute angle at the vertex, or whose axis in a right cone makes less than half a right angle with the side.

Acute disease. Morbus acutus. A disease which is attended with an increased velocity of the blood, terminates in a few days, and is generally accompanied with danger. It is opposed to a chronic disease, which is slow in its progress, and not so generally dangerous.

Acute, in music, a term applied to any sound that is sharp, or high, in respect of some other: this word stands opposed to grave; and the consideration of sounds as grave and acute constitutes tune.

ACUTELY. *ad.* (from *acute.*) After an acute manner; sharply (*Locke*).

ACUTENESS. *s.* (from *acute.*) 1. Sharpness. 2. Force of intellect (*Locke*). 3. Quickness and vigour of senses (*Locke*). 4. Violence and speedy crisis of a malady (*Bro.*) 5. Sharpness of sound (*Boyle*).

ACUTIATOR, in writers of the barbarous ages, denotes a person that whets or grinds cutting instruments.

ACYESIS (ακυησις, from α neg. and κυω, *to conceive.*) Defect in the sexual powers, barrenness.

ACYROLOGIA, denotes an improper acceptation or expression, wherein a word or phrase is used in some unusual or oblique sense, hardly reducible to the rules of language.

AD, a Latin preposition, originally signifying *to*.

Ad bestias, in antiquity, the punishment of criminals condemned to be thrown to wild beasts.

Ad extra, and Ad intra, terms used by school divines. The former is applied to those operations of the Supreme Being, whose term or effect is not within his essence; the latter to such whose term or effect is within his essence.

Ad hominem, among logicians, is applied to a kind of argument drawn from the belief, the principles, or the prejudices, of those argued with.

Ad libitum, in music, an expression which gives the performer liberty at that part of the composition where it is written, to give way to the directions of his own fancy.

Ad ludos, a Roman sentence, whereby criminals were condemned to entertain the people, by fighting with beasts, or with each other.

Ad metalla, the punishment of such criminals (called metallici) as were condemned to work in the mines.

Ad quiddities, among schoolmen, those attributes of things which answer to the question *ad quid? to what?* They differ from mere quiddities, which answer to the question *quid est? what is it?* The former enquire what things are, *ad alia*, the latter what they are in themselves.

Ad valorem, a term chiefly used when speaking of the duties or customs paid for certain goods which are taxed according to their value.

ADACTYLUS (αδακτυλος, from α neg. and δακτυλος, *a finger.*) A term applied to animals without claws.

ADÆMONIA (αδαιμονια, from α priv. and δαιμων, *a genius*, or *fortune.*) In medicine, inquietude, restlessness, anxiety, perturbation.

ADAGE *s* (*adagium*, Lat) A proverb, a maxim, a popular saying

ADAGIO, in music, a word used to denote a degree or distinction of time it is generally applied to music, not only meant to be performed in a slow time but also with grace and embellishment It is likewise frequently used substantively, as when we say "an adagio of Corelli

ADALIDES, in the Spanish policy, officers of justice for matters relating to the military forces

ADAM, in Scripture history, the first man whom God created and the original parent of the whole human race He was formed by an immediate act of divine power, out of the dust of the ground, as his name imports and God breathed into his nostrils the breath of life, so that he became a living soul, or person He was placed in the garden of Eden, and, in process of time, probably after some experience of the inconveniences of solitude, he was provided with a suitable helpmate of the female sex, called Eve The particulars of the history of these our first parents, are too numerous and too interesting to be detailed in small compass, we therefore refer to the first five chapters of the book of Genesis Adam died at the age of 930 years The etymology of the name Adam, the time of the year in which he was created the vigour of his intellectual faculties, &c have been made the subject of many tedious discussions and fanciful conjectures into which we shall not enter as they would be of no benefit to the general reader

ADAMANT, ADAMAS, an ancient name for a precious stone by us called the diamond, it is also used to denote a species of iron, or the hardest and most highly tempered part of that substance, and sometimes it is applied to the magnet or loadstone

ADAMANTA, a kind of earth, supposed at first by Klaproth to be a distinct genus but afterwards discovered by him to be only a compound of alumine and silex

ADAMANTEAN *a* (from *adamant*) Hard as adamant (*Milton*)

ADAMANTINE *a* (*adamantinus*, Lat) 1 Made of adamant (*Dryden*) 2 Having the qualities of adamant, as, hardness, indissolubility (*Davies*)

ADAMANTINE In Gmelin's system of oryctology an order of the class earths, ordinarily characterised as consisting chiefly of corunda or adamantine earth, resisting heat, fixt, hard lamellar

ADAMANTINE SPAR, or CORUNDUM a very hard stone found in China, and in the East Indies near Bombay There are two varieties of this stone, which were analysed, after considerable difficulty, by Klaproth who found that from China to contain 84 parts of alumine, 7·5 oxyd of iron 6·5 of silex and that from India 89·5 parts of alumine, 1·25 oxyd of iron, and 5·5 of silex Adamantine spar exists naturally both in mass and in crystals That brought from Bengal in the former state, is of a purplish hue and compact fracture, and its specific gravity 3 876, that from Coromandel is of a foliated texture, appears to be confusedly crystallized, and is of the specific gravity 2 785 Crystals of this spar are procured both from India and China, those from India are generally the purest The usual form of these crystals is that of a regular hexaedral prism of a rough surface, and little external lustre, but they are occasionally met with in other forms (See CRYSTALLIZATION) The colour of the Indian variety is grey, with shades of green and light brown, in thin pieces, and at the edges of the crystals it is semitransparent, it is brittle, and so hard as to cut rock-crystal and most of the gems its specific gravity is from 3 950, to 3 990 The Chinese crystals differ from these in containing grains of magnetic iron ore, in being generally of a darker colour, and in having a superior gravity though inferior in hardness The use of adamantine spar, throughout India and China, is that of polishing steel and gems for which its great hardness renders it peculiarly proper This substance is said to have been found in France, by count Bournon, at Tiree, one of the Hebrides, by M Raspe, and very lately at Chesnut hill, about ten miles from Philadelphia, by Mr Adam Seybert

ADAMANTINUS In oryctology, the only genus of the class earth order adamantine consisting of adamantine earth the greater part alumina a little silica and iron very hard, ponderous and lamellar, with strait foliations intersecting each other in a triple manner, breaking into rhomboidal fragments, perfectly apyrous, and yielding a little to the file The only known species is the a corundum, diamond spar adamantine spar Corundum of Klaproth Imperfect corundum of Thomson Found in China, Bombay, France, and Spain in granite colour grey, with often various shades of green, blue, and brown, lustre transparent, and when polished, shines like mother of pearl, is sometimes found massive, but most commonly in six-sided prisms, and simple, acute, six-sided, truncated, pyramids It is used like diamond, however, for cutting and polishing hard minerals

ADAMAS The diamond A genus of the Gmellinian class earths, order siliceous Consists of silica and carbon, slightly ponderous, extremely hard, lamellar, exhibiting a high peculiar lustre, breaking into indeterminate fragments, parasitical, shining in the dark after being exposed to the rays of the sun, attracting light bodies when rubbed, or heated, crackling and losing its transparency in the fire, and at 14° or 15° of Wedgewood's pyrometer, beginning to burn, till at length it entirely evaporates Eight species from difference of prism The adamas, or diamond, is found in Borneo, the provinces of Golcondo and Visiapour, and at the foot of the Orixa mountains in Bengal in South America, in the district of Terra do Frio in Brazil, generally in loose sand, or inclosed in a loam earth, very

rarely aggregate, or attached to other fossils Of all mineral substances, it possesses far the greatest degree of hardness, transparency, and lustre fracture straight, and perfectly foliated It is either colourless, or red, greenish, yellowish, brownish, black, or steel blue, with sometimes specks or clouds It is of all gems the most precious, and from its entirely consuming like an inflammable substance, may probably be considered as a very pure species of coal

Adamas (*αδαμα*, from *α* neg and *δαμαω*, *to conquer*, as not being easily broken) The adamant, or diamond, formerly supposed to be possest of extraordinary medical virtues

Adamas, in astrology, a name given to the moon

ADAMIC EARTH, terra adamica, a name by which some call the common red clay supposed to be the adamah or ruddy earth, of which the first man was formed

ADAMITES in ecclesiastical history the name of a sect of ancient heretics, supposed to have been a branch of the Basilidians and Carpocratians

ADAMITUM (from *adamas*) Any stone resembling the hardness of the diamond Sometimes applied to urinary calculi

ADAMS (George), an ingenious optician and natural philosopher, was born about the year 1750 We have not been able to obtain any particulars respecting his early life At about thirty years of age we find him much celebrated as a maker of mathematical and philosophical instruments his shop was in Fleet-street, and was much resorted to The writer of this article, has with many others, been highly delighted with the ease accuracy, good-nature, and unassuming modesty, with which he explained the nature and use of any particular instrument when the purchaser requested such explanation He published Essays on the Microscope, Essays on Electricity and Magnetism, Astronomical and Geographical Essays, Geometrical and Graphical Essays, An Essay on Vision, Lectures on Natural and Experimental Philosophy, five volumes octavo Appendix to the Geometrical and Graphical Essay He had projected other performances, but was prevented from executing them by death, which put a close to his useful labours, at Southampton, August 14 1795, aged 45 He was a man of an amiable and communicative disposition, which endeared him to all who had the pleasure of knowing him His life had been devoted to religious and moral duties, to the acquisition of science and its diffusion for the benefit of mankind To those who had no personal knowledge of Mr Adams, his works will continue to display not only his merits as an author, but his virtues as a valuable member of society

Adam's apple See **Pomum adami**, and **Citras**

Adam's needle The roots of this plant, yucca gloriosa of Linnæus, are thick and tuberous, and are used by the Indians instead of bread, being first reduced into coarse meal This, however, is only in times of scarcity See **Yucca**

ADAMUS, the name given by alchemists to the philosopher's stone

ADANSONIA Sour-gourd, monkeys bread So called after the African traveller Adanson A genus of the Linnæan class and order monadelphia polyandria, thus characterised calyx single, deciduous style very long stigmas numerous capsule wood ten celled, seeds numerous, imbedded in farinaceous pulp The only known species was discovered by Adanson on the banks of the Senegal It produces the terra sigillata lemnia

To **ADAPT** *v a* (*adapto*, Lat) To fit to suit, to proportion (*Swift*)

ADAPTATION *s* (from *adapt*) The act of fitting one thing to another, the fitness of one thing to another (*Boyle*)

ADAPTION *s* (from *adapt*) The act of fitting (*Cheyne*)

ADAR, in the Hebrew chronology, the twelfth month of their ecclesiastical year, and the sixth of their civil year It contains only nine and twenty days and answers to part of February and March

ADARCON a gold coin mentioned in Scripture worth about fifteen shillings

To **ADD** *v a* (*addo*, Lat) 1 To join something to that which was before 2 To perform the mental operation of adding one number or conception to another (*Locke*)

To **ADDECIMATE** *v a* (*addecimo*, Lat) To take or ascertain tithes

To **ADDEEM** *v a* (from *deem*) To esteem to account out of use (*Daniel*)

ADDEPHAGIA (*αδδηφαγια*, from *αδην*, *largely*, and *φαγω* *to eat*) Ravenous appetite Bulimia

ADDER *s* (ættern, Sax *poison*) A serpent, a viper, a poisonous reptile (*Taylor*) See **Coluber**

Adder's tongue See **Ophioglossum**

Adder's wort See **Polygonum**

ADDEXTRATORES the pope's mitre-bearers, so called according to Ducange on account of their walking at the pope's right hand when he rides to visit the churches

ADDIBILITY *s* (from *addible*) The possibility of being added (*Locke*)

ADDIBLE *a* (from *add*) Possible to be added (*Locke*)

ADDICE *s* (corruptly *adz*, adese, Sax) A kind of axe (*Moxon*)

To **ADDICT** *v a* (*addico* Lat) 1 To devote, to dedicate (*Cot*) 2 It is commonly taken in a bad sense, as, he addicted himself to vice

ADDICTEDNESS *s* (from *addicted*) The quality or state of being addicted (*Boyle*)

ADDICTI, in Roman antiquity, slaves who were reduced to that state because they could not satisfy some creditor, whose slave they became till they could pay or work out the debt

ADDICTIO **Addiction**, in the Roman law, a transferring, or passing over goods to

another, whether by sentence of a court, or in the way of sale, to him that bids most for them

Addictio in diem, denoted the adjudging of a thing to a person for a certain price, unless by such a day the owner, or some other person, gave more for it

ADDICTION *s* (*addictio*, Lat) 1 The act of devoting, or giving up 2 The state of being devoted (*Shakspeare*)

ADDISON (Joseph), was born at Milston, near Ambresbury, Wilts, on May 1, 1672, and being unlikely to live, was baptized the same day After receiving the rudiments of education at different schools he was sent to the Charter house where he contracted an intimacy with Sir Richard Steele In 1687, he was admitted of Queen's college Oxford, and two years afterwards into Magdalen college In 1693, he took his degree of M A and became eminent for his Latin poetry In his twenty-second year, he addressed some verses to Dryden in English, and not long after published a translation of the greatest part of Virgil's fourth Georgic About this time he wrote the arguments prefixed to the several books of Dryden's Virgil, and composed the essay on the Georgics In 1695, he addressed a poem to king William, which recommended him to lord Somers In 1699, he obtained a pension of 300*l* a year, to enable him to travel He went leisurely through France and Italy, improving his mind to the best advantage, as appears from his "Letter to Lord Halifax," reckoned the most elegant of his poetical performances and his Travels in Italy, which he dedicated at his return to lord Somers He returned home in 1702, and found his old friends out of place In 1704 lord Godolphin was lamenting to lord Halifax that the victory at Blenheim had not been celebrated as it ought to have been, and desired him to recommend a good poet, who, he said, should not go unrewarded Halifax proposed Addison who set about it with vigour, and while he was writing his "Campaign" the treasurer was so pleased with it, that he appointed him to succeed Mr Locke as commissioner of appeals In the next year, he was at Hanover with lord Halifax and the year following became under-secretary of state The rage for Italian operas which then prevailed induced him to write his "Rosamond" which did not succeed, probably because it was English When the marquis of Wharton went to Ireland as lord lieutenant, Addison accompanied him as secretary, and was made keeper of the records there, with a salary of 300*l* a year While he was in Ireland Steele commenced the Tatler to which Addison liberally contributed This was followed by the Spectator which was enriched by the contributions of Addison whose papers are distinguished by one of the letters of the word CLIO In 1713, his tragedy of Cato was brought upon the stage, amidst the plaudits of both whigs and tories Cato was praised by most of the contemporary poets criticised by Dennis, attacked as a party play at Oxford, and vindicated by Dr Sewel It was translated into Italian, and performed at Florence, and into Latin at the college of St Omers At this time the Guardian appeared, to which Addison largely contributed, whose papers are marked by a hand But the violence of politics soon put a stop to this paper, and Addison himself engaged in the party warfare, but his political pieces being on temporary topics, soon sunk into neglect An attempt was made to revive the Spectator, but after the publication of eighty numbers, which compose the eighth volume, the work was relinquished Addison's quota amounts to about a fourth part December 23, 1715, he began the Freeholder, and continued it till the middle of the next year in defence of the government In August 1716 he married the countess dowager of Warwick after a long courtship, but much happiness did not result from this connection The following year he was appointed a secretary of state to George I but his health, which had before been impaired by an asthmatic disorder suffered by his advancement, on this account, together with his want of courage to speak in public (as some assert), he resigned this office In his retirement, he applied himself to the writing A Treatise in Defence of the Christian Religion, part of which appeared after his death, and makes us regret that he did not live to perfect it We have been told that he had, likewise, formed the design of compiling an English Dictionary but this he never began, for a severe relapse put a period to his life on the 17th of June 1719 in the 48th year of his age A little before his death, he had an interview with his former pupil the young earl of Warwick, of which Dr Young gave the following account After a long and manly, but vain struggle with his distemper, he dismissed his physicians, and with them all hopes of life But with his hopes of life he dismissed not his concern for the living, but sent for a youth nearly related, and finely accomplished, but not above being the better for good impressions from a dying friend He came, but life now glimmering in the socket the dying friend was silent after a decent and proper pause, the youth said, 'Dear sir! you sent for me, I believe, and hope, you have some commands, I shall hold them most sacred May distant ages not only hear but feel, the reply! forcibly grasping the youth's hand, he softly said, "See in what peace a Christian can die He spoke with difficulty and soon expired We shall not enter into a critique of Addison's writings but shall conclude with the words of Dr Johnson, who after drawing his character in a forcible and elegant manner, says, "whoever wishes to attain an English style, familiar but not coarse, and elegant but not ostentatious, must give his days and nights to the volumes of Addison

ADDITAMENT, something added to another Thus physicians call the ingredients added to a medicine already compounded, additaments

ADDITAMENTUM (from *addo*, to add) The same as EPIPHYSIS, which see

ADDITAMENTUM COLLI See APPENDICULA CÆCI VERMIFORMIS

ADDITION, the act of joining one thing to another, or of augmenting a thing, by the accession of others

ADDITION is also used for the thing added with itself

ADDITION, in arithmetic, is the first of the four fundamental rules of that science it is, in fact, the finding of the most simple expression in the established notation, equivalent to the sum of certain numbers Simple addition may be performed by this rule

Example

Write the numbers distinctly, units under units, tens under tens, and so on Then reckon the amount of the right-hand column If it be under ten, mark it down If it exceed ten, mark the units only, and carry the tens to the next place In like manner, carry the tens of each column to the next and mark down the full sum of the left hand column

340863
870734
123467
314213
712316
438087
279654
3002234

One of the best methods of proof, is to separate the numbers into two or three smaller parcels then to find the sum of each parcel and if the aggregate of those sums corresponds with the total of the original operation, the work is right

COMPOUND ADDITION, is that by which numbers of different denominations, are collected into one sum

Rule

1 Place the numbers so that those of the same denomination may stand directly under each other, and draw a line below them 2 Add up the figures in the lowest denomination, and find how many ones of the next higher denomination are contained in their sum 3 Write down the remainder, and carry the ones to the next denomination, with which proceed as before, and so on through all the denominations to the highest whose sum must be all written down, and this sum, together with the several remainders, is the total sum required

Examples

L	*S*	*D*
84	17	$0\frac{1}{4}$
32	11	$4\frac{1}{2}$
57	6	7
25	13	$2\frac{3}{4}$
73	0	$4\frac{1}{2}$
273	9	1

Yards	*Feet*	*Inch*
327	1	6
428	2	9
7[illegible]	1	8
43	0	7
6	2	11
870	0	5

ADDITION OF FRACTIONS First reduce the fractions to their simplest form, also to a common denominator, if their denominators are different, then add all the numerators together, and set the sum over the common denominator, for the sum of all the fractions is required

Thus, $\frac{2}{7}+\frac{3}{4}=\frac{8}{28}+\frac{21}{28}=\frac{29}{28}=1\frac{1}{28}$

And $\frac{1}{2}$ of $\frac{2}{3}+\frac{3}{5}$ of $\frac{5}{6}=\frac{1}{3}+\frac{3}{6}=\frac{2}{6}+\frac{3}{6}=\frac{5}{6}$

ADDITION OF DECIMALS, is performed by arranging the numbers so that the decimal points fall under each other, and then proceeding as in simple addition

Thus to add 4.625, 15.75, 168.5, 25.674, and 71821 together, let them be placed and summed as in the margin

4.625
15.75
168.5
25.674
71821
215.20721

ADDITION OF CIRCULATING DECIMALS, may be performed by converting each of them into its equivalent vulgar fraction, and finding the sum of such fractions But the following rule is easier, and full as accurate make the repetends similar and conterminous and arrange them so that the decimal points fall under each other then in adding, first reckon up about three of the left-hand columns of the circulating part, and let the tens which arise from the last of these, be carried as so many units to the right hand column of the circulate, after which the whole must be added as in common addition

Example

Add 3.6, 78.3476, 42.84 and 15.5 together

Dissimilar		*Similar and conterminous*
3.6	=	3.6666666
78.3476	=	78.3476476
42.84	=	42.8484848
15.5	=	15.5000000
The sum		140.3627091

Here, when the three left hand columns of the circulate are summed the last amounts to 16, from which 1 is carried to the right hand column

ADDITION, in algebra, is the uniting or incorporating of indeterminate quantities, denoted by letters, into one contracted expression, or mass The operation is performed by connecting the quantities together by their proper signs and uniting or reducing such as are susceptible of it, namely similar quantities, by adding their co efficients together if the signs are the same, but subtracting them when different Thus the quantity a added to the quantity b, makes $a+b$, and a joined with $-b$, makes $a-b$, also $-a$ and $-b$ make $-a-b$, and $3a$ and $5a$ make $3a+5a$ or $8a$, by uniting the similar numbers 3 and 5 to make 8

Thus also $3a+2bc-4a^2b+c^3$
added to $2a-2bc+3a^2b+2c^3$

makes $5a \quad 0 \quad - \quad ab+3c^3$

Also $\frac{4a}{3c}+\frac{2a}{3c}=\frac{6a}{3c}=\frac{2a}{c}$,

and $3\sqrt{ac}+5\sqrt{ac}-1\frac{1}{2}\sqrt{ac}=6\frac{1}{2}\sqrt{ac}$,

and $\frac{3a+7\sqrt{2x}}{a+x}+\frac{7-3a\sqrt{2x}}{a+x}=\frac{14\sqrt{2x}}{a+x}$,

and $\frac{8a\sqrt{ax}}{a+2c}+\frac{16c\sqrt{ax}}{a+2c}=\frac{8a+16c\sqrt{ax}}{a+2c}=8\sqrt{ax}$,

and $+3-2=1$, and $-3+2=-1$,

and $\frac{7ax}{b}-\frac{4ax}{c}=\frac{7acx}{bc}-\frac{4abx}{bc}=(7c-4b)\frac{ax}{bc}$

ADDITION OF ALGEBRAIC FRACTIONS See FRACTIONS

ADDITION OF SURDS See SURDS

ADDITION OF LOGARITHMS See LOGARITHMS

ADDITION OF RATIOS See COMPOSITION

ADDITION OF CONCORDS See CONCORD

ADDITION OF FORCES, is or ought to be, made use of, to express the sum of two or more forces when the directions in which they act coincide For, if two forces act in the same direction, we cannot, with propriety, speak of their composition into a third, since that implies a difference in the direction, while, in this instance, the direction remains unchanged, and the force is increased in full proportion to the sum of the combined powers See COMPOSITION

ADDITIONS, in distilling, a name given to such things as are added to the wash, or liquor, while in a state of fermentation, to improve the vinosity of the spirit, produce a larger quantity of it, or give it a particular flavour Of these additions there are four kinds, salts, acids, aromatics, and oils, and sometimes, by prudent management, a large proportion of rectified spirit may also be introduced with advantage See DISTILLATION

ADDITION, in law, is that title which is given to a man over and above his proper name and surname, to show of what estate, degree, or profession he is, and of what town, village, or country

ADDITIONS OF ESTATE, or QUALITY, are, yeoman gentleman, esquire, and suchlike

ADDITIONS OF DEGREE, are those we call names of dignity, as knight, lord, earl, marquis, and duke

ADDITIONS OF MYSTERY, are such as scrivener, painter, mason, and the like

ADDITIONS OF PLACE, are, of thorp, of dale, of wood stock Where a man hath household in two places, he shall be said to dwell in both so that his addition in either may suffice Knave was anciently a regular addition

ADDITIONS, in heraldry, denote a kind of bearings, in coats of arms, wherein are placed rewards, or additional marks of honour

ADDITIONAL *a* (from *addition*) That is added (*Addison*)

ADDITIVE denotes something to be added to another Thus astronomers speak of additive equations, namely, those which added to the sun's mean anomaly, give the true one

ADDITORY *a* (from *add*) That has the power or quality of adding (*Arbuthnot*)

ADDLE *a* (from adel, *a disease*, Sax *Skinner*, perhaps from ydel, *idle, barren, unfruitful*) Originally applied to eggs, and signifying such as produce nothing, thence transferred to brains that produce nothing (*Burton*)

To A'DDLE *v a* (from the adjective) To make addle, to make barren (*Brown*)

ADDLE-PATED *a* Having barren brains (*Dryden*)

To ADDRE'SS *v a* (*addresser*, Fr) 1 To prepare one's self to enter upon any action (*Shakspeare*) 2 To get ready (*Hayward*) 3 To apply to another by words

ADDRESS *s* (*addresse*, Fr) 1 Verbal application to any one, petition (*Pr*) 2 Courtship (*Addison*) 3 Manner of accosting another 4 Skill, dexterity (*Swift*) 5 Manner of directing a letter

ADDRESSER *s* (from *address*) The person that addresses or petitions

ADDUCTOR (from *ad*, and *duco*, to draw to) A name given to various muscles, whose office is to approximate those parts of the body to which they are annexed

Adductor ad minimum digitum, a muscle of the little finger

Adductor auris, a muscle of the ear

Adductor brachii, a muscle of the arm

Adductor digiti minimi pedis, a muscle of the little toe

Adductor femoris primus vel longus, a muscle of the thigh

Adductor femoris secundus vel brevis, a muscle of the thigh

Adductor femoris tertius vel magnus, a muscle of the thigh

Adductor femoris quartus, a muscle of the thigh

Adductor indicis, a muscle of the forefinger

Adductor oculi a muscle of the eye

Adductor pollicis manus ad indicem, a muscle of the thumb

Adductor pollicis pedis, a muscle of the great toe

ADE'CTA (from *a* neg and δακνω, *to bite*) Medicines that remove the biting sensations produced by pain Emollients

ADEL, or ZEILA, a kingdom in Africa, bounded on the south by Magadoxo, on the east by part of the Eastern ocean, on the north by the streights of Babelmandel, and on the west by the Gallees This country abounds with wheat, millet, frankincense, and pepper The inhabitants are Mahometans Adel, its capital, is situated about 300 miles south of Mocha Lat 8 5 N Lon 44 20 E

ADE'LIA In botany, a genus of the Linnean class and order, dioecia gynandria thus generically characterised male calyx, three-parted, corolless stamens numerous united at the base Female calyx, five-parted, corolless, styles three, lacerated, capsule three-grained It is a native of Jamaica, which offers three species

ADELOUS (*adelus*, αδηλος, from *a* neg and δηλω, *manifest*) In medicine, insensible, imperceptible, as applied chiefly to cutaneous perspiration

ADELPHIA (ἀδελφια, from ἀδελφος, *a brother*) In medicine, similarity of diseases

ADELPHIANA *s* A sect of ancient heretics, who always fasted on Sundays

ADELPHIXIS (ἀδελφιξις, from ἀδελφος, *brother*) Sympathy, or consent of parts

ADELSCALE, in ancient customs, a servant of the king

ADEMPTION, ADEMPTIO, in the civil law, the revocation of a grant, donation, or the like The ademption of a legacy may be either express, as when the testator declares in form, that he revokes what he had bequeathed or tacit, as when he only revokes it indirectly, or implicitly See RECISSION

ADEN (ἀδην, *a gland*) A gland

ADENANTHERA Bastard flower-fence In botany, a genus of the Linnean class and order decandria, monogynia, thus characterised calyx five-toothed, petals five, anthers incumbent, bearing a globular gland at the outer tip, legume membranaceous It is a native of the East Indies, and furnishes three species

ADENIFORM (*adeniformis*, from ἀδην, *a gland*, and *forma*, resemblance) Glandiform, or resembling a gland A term sometimes applied to the prostate gland It is a bad and illegitimate word, however as compounded of two distinct languages, and should be relinquished for adenoid, or glandiform

ADENOGRAPHY (*adenographia* ἀδηνογραφια, from ἀδην, *a gland*, and γραφω, *to write*) A treatise on the glands

ADENOID (from ἀδην, *a gland*, and ειδος, *a likeness*) Glandiform, resembling a gland

ADENOLOGY (*adenologia*, ἀδηνολογια, from ἀδην, *a gland*, and λογος *a discourse*) The doctrine of the glands See GLANDS

ADENOS, a kind of cotton often called marine cotton It comes from Aleppo by the way of Marseilles

ADENOUS ABSCESS (*abscessus adenosus*, from ἀδην, *a gland*) A hard glandular abscess, which suppurates slowly

ADEONA In mythology, the name of a goddess invoked by the Romans, when they set out upon a journey

ADEPHAGIA, the Sicilian goddess of gluttony

ADEPS An oily secretion from the blood into the cells of the cellular membrane See FAT

ADEPTS, ADEPTI from *adipisci*, to obtain, a name assumed by those proficients in alchemy, who engaged in researches after the philosopher's stone, and the universal medicine, or who pretended to have succeeded in these researches Though the extravagant projects of the alchemists had been invariably unsuccessful, yet in the sixteenth century a prodigious number of them appeared at the head of whom was Paracelsus, a Swiss physician, whose reveries were eagerly embraced by the rest This extraordinary man, in whom was united great energy of mind with great weakness and credulity, and a success in medicine almost unparalleled, with the utmost ardour and absurdity of expectation, revived the notion which Raymond Lully and other alchemists had entertained, of a universal medicine, capable of curing all diseases, in all times in all places, and in every variety of constitution and circumstance The eagerness and confidence with which Paracelsus pursued this object, engaged many others to co-operate with him, who without laying aside their former enquiries into the transmutation of metals and the making of gold, vied with each other in ardency to discover the universal remedy, and persuaded themselves that these several miracles might be effected by one chemical process With these views, which they expected to see realised and pretending besides that they were taught from heaven in some mysterious manner, they arrogated to themselves the title of adepts, which has ever since been applied to them as a term of derision The term adepts is also applied, in a more general and respectful sense, to those who are proficients in any kind of science

ADEQUATE *a* (*adequatus*, Lat) Equal to, proportionate (*South*)

ADEQUATELY *ad* (from *adequate*) In an adequate manner, with exactness of proportion (*South*)

ADEQUATENESS *s* (from *adequate*) The state of being adequate, exactness of proportion

ADES, or HADES, ἀδης, from α and ιδω, denotes the invisible state In the heathen mythology, it comprehends all those regions that lie beyond the river Styx, viz Erebus, Tartarus, and Elysium (See HELL) The Greeks sometimes used the word Ades, to denote the god of hell the Pluto of the Latins Dr Campbell observes, that the word ades occurs eleven times in the New Testament, and is translated hell in all, except one, where it is translated grave He thinks, however, that it ought never in Scripture to be rendered hell, at least, in the sense applied to that word by Christians In the Old Testament the corresponding word is sheol (as in Ps xvi 5, 10) which signifies the state of the dead in general, without regard to their character or condition, either of happiness or misery Dr Doddridge entertains a similar opinion See his Family Expositor, vol i p 485 note f, where he refers to Mr Howe's works vol ii p 61 in proof that the word generally signifies the invisible world in general Indeed the primitive meaning of the Saxon word hell is much the same, and even now the verb to hill or to hell, is used in many parts of England as denoting to cover up or hide

ADESSENARII, a name given to those who hold that Jesus Christ is really present in the eucharist but in a manner different from what the Romanists hold

ADFECTED EQUATION, in algebra, an equation in which the unknown quantity is found under two or more different powers For example $x^3 - mx^2 + nx = r$, is an adfected cubic equation

To **ADHERE** *v a* (*adhereo*, Lat) 1 To

stick to 2 To be consistent, to hold together (*Shakspeare*) 3 To remain firmly fixed to a party, person, or opinion (*Shakspeare Boyle*)

ADHERENCE, ADHERENCY *s* (from *adhere*) 1 The quality of adhering, tenacity 2 Fixedness of mind, steadiness, fidelity

ADHERENT *a* (from *adhere*) 1 Sticking to (*Pope*) 2 United with (*Watts*)

ADHERENT *s* (from *adhere*) A follower, a partisan (*Raleigh*)

ADHERER *s* (from *adhere*) He that adheres

ADHESION (*adhæsio* from *adhæreo*, to stick) 1 The growing together of parts

ADHESION in philosophy and chemistry, a species of attraction which takes place between the surfaces of bodies, either similar or dissimilar, and which in a certain degree connects them together, thus water adheres to the finger, mercury to gold, two pieces of lead or brass to each other, &c In this respect it is different from cohesion which, uniting particle to particle, retains together the component parts of the same mass It has been proved that the power of adhesion is proportional to the number of touching points which depends upon the figure of the particles that form the bodies, and in solid bodies, upon the degree in which their surfaces are polished and compressed The effects of this power are extremely curious, and in many instances astonishing Musschenbroek relates that two cylinders of glass, whose diameters were not quite two inches, being heated to the same degree as boiling water, and joined together by means of melted tallow lightly put between, adhered with a force equal to 130 pounds lead of the same diameter, and in similar circumstances, adhered with a force of 275 pounds, and soft iron with one of 300 pounds (Musschenbroek's Philosophy, by Colson) And Martin, in his Philosophia Britannica, vol i says that with two leaden balls, not weighing above a pound each, nor touching upon more than $\frac{1}{10}$ of a square inch surface, he has lifted more than 100lb weight The balls were first planed very finely with the edge of a sharp penknife and then equally pressed together with a considerable force and a gentle turn of the hand The force of adhesion between two brass planes, each $4\frac{1}{2}$ inches diameter, and smeared with grease or fat, was so great that Mr Martin asserts that he never could meet with two men strong enough to separate them by pulling against each other These instances are sufficient to give an idea of the nature of this power those who wish for more experiments may find them detailed in the two books referred to, in Supplement to Encyclopædia Britannica art Chemistry, p 45, &c and in Rees's Cyclopædia, in the article Adhesion To measure the force of adhesion between different substances, and in different temperatures and circumstances, various methods have been contrived but the best is that which was suggested by Dr Brook Taylor, whose experiments led him to conclude that the force of adhesion might be determined by the weight necessary to produce a separation, and which has since been pursued and extended by M de Morveau (now M Guyton) with considerable success He constructed cylinders of different metals, perfectly round, an inch in diameter, and the same in thickness, having a small ring in their upper surface by which they might be hung exactly in equilibrium These cylinders were suspended, one after another, to the beam of a balance, and when they counterpoised exactly, were applied to mercury placed about $\frac{1}{2}$ of an inch below them After sliding them along the surface to prevent any air from lodging between them and the mercury, he marked exactly the weight necessary to overcome their adhesion taking care to change the mercury after every experiment The results were as follow

Gold adheres to mercury with a force of 446 grs

Silver	429	Zinc	204
Tin	418	Copper	242
Lead	397	Antimony	126
Bismuth	372	Iron	115
Platina	282	Cobalt	8

This method which when it can be applied, is the most direct and accurate of all that have yet been devised, has been pursued to still greater lengths and degrees of nicety by M Achard and others, whose experiments our limits will not allow us to detail From what has been done altogether we may deduce the following conclusions —That there exists a tendency to adhesion between many, and probably between all substances in nature, absolutely independent of atmospherical or any other external pressure, that the force of this adhesion between solids is in the order of their chemical affinities, and between solids and fluids is in an inverse ratio to the thermometrical temperature, and a direct ratio to the squares of the surfaces, that every solid adheres with a peculiar force to each fluid, that this force is truly expressed by the weight necessary to break the adhesion in all cases where the solid comes out clear from the fluid, but that whenever any particles of the fluid adhere to the solid, the weight of the counterpoise is then expressive of the mixed forces of the adhesion between the surfaces of the solid and the fluid and of the cohesion between the component parts of the fluid

ADHESIVE *a* (from *adhesion*) Sticking, tenacious

ADHESIVE INFLAMMATION A term lately introduced into surgery, to express that species of inflammation which terminates by an adhesion of the inflamed surfaces, thus the pleura of the lungs, when inflamed, unites to that of the ribs

To ADHIBIT *v a* (*adhibeo*, Lat) To apply, to make use of (*Forbes*)

ADHIBITION *s* (from *adhibit*) Application, use

ADHIL, in astronomy, a small star under Andromeda's foot

ADHOA, ADOHA, or ADHOGAMENTUM, in ancient customs, denotes what is often called relief

ADJA'CENCY s (from *adjaceo*, Lat) 1 The state of lying close to another thing 2 That which is adjacent (*Brown*)

ADJA'CENT a (*adjacens* Lat) Lying close, bordering upon something (*Bacon*)

ADJACENT s That which lies next another (*Locke*)

ADIA'NTHUM, ADIANTUM (from α neg and διαινω, *to grow wet*, because its leaves are not easily wetted) Maiden-hair In botany, a genus of the Linnéan class and order cryptogamia, filices, thus characterised fructification in distinct marginal dots or small lines, involucres membranaceous, distinct, from the turned-in margin of the frond, opening towards the rib There are nearly forty species of this fern which may be divided into, 1 those with genuine capsules innate in the involucres, comprehending those with a simple frond, a compound frond, a frond decompound, frond more than decompound 2 Those with spurious fructification in distinct marginal dots, covered with scale-like involucres, not innate The maiden-hair of the confectioners, is the a capillus veneris It is somewhat sweet and austere to the palate and possesses mucilaginous qualities The syrop de capillaire is prepared from it

ADIANTUM AUREUM The plant which is thus called in the pharmacopœias is the polytricum commune caule simplici anthera parallelepiped the varietas α of p commune of Linnæus It possesses in an inferior degree adstringent virtues and was formerly given in diseases of the lungs and calculous complaints

ADIAPHORISTS in church history a name importing lukewarmness given in the sixteenth century, to the moderate Lutherans

ADIAPHOROUS a (αδιαφ , Gr) Neutral (*Boyle*)

ADIAPHORY s (αδιαφορια, Gr) Neutrality, indifference

ADIAPNEUSTIA (*adiapneustia* αδιαπνευστια, from α priv and πνεω, *to perspire*) A diminution or obstruction of the natural perspiration

ADIB (from *adil* Arab) The wolf whose liver is commended by Avicenna, upon the theory of sympathetic medicine, in all hepatic affections See CANIS

To **ADJECT** v a (*adjicio*, *adjectum*, Lat) To add to to put to another thing

ADJECTION s (*adjectio* Lat) 1 The act of adjecting, or adding 2 The thing adjected, or added (*Brown*)

ADJECTITIOUS a (from *adjection*) Added thrown in upon the rest

ADJECTIVE in grammar a kind of noun joined with a substantive, either expressed or implied, to shew its qualities or accidents The word is formed of the Latin *adjicere*, *to add to*, as designed to be added to a substantive without which it has no precise signification Father Buffier defines adjective in a manner somewhat different from other grammarians —Nouns, according to him, are substantives, when the objects which they represent are considered simply, and in themselves, without any regard to their qualities on the contrary, they are adjectives, when they express the quality of an object Thus, when I say simply, a heart, the word heart is a substantive, because none of its qualities are expressed, but when I say, a generous heart, the word generous is an adjective, because it adds a quality, or attribute, to the heart Adjectives then, appear to be nothing else but modificatives In effect, the end of an adjective being only to express the quality of an object, if that quality be the object itself whereof we speak, it becomes a substantive, e gr if I say, this book is good, good here, is an adjective but if I say, good is always to be chosen, it is evident good is the subject I speak of, and consequently, good there, is the substantive On the contrary, it often happens in other languages, and sometimes in our own, that a substantive becomes an adjective, as, for instance, in these words the king, hero as he is remember he is a man, where the word hero, though ordinarily a substantive, is yet apparently an adjective As every quality supposes a substance of which it is the quality, it follows that every adjective supposes a substantive If we say the fine touches you, the true ought to be the subject of our enquiries, the good is preferable to the handsome, the rich relieve you &c it is evident that we consider these qualities so far only as they are attached to some substance or agent the fine that is the substance which is fine, the true, or that which is true, &c In these examples, the fine the true, &c are not merely adjectives they are adjectives used substantively, they denote any agent whatsoever, provided that agent be fine, true, good &c It therefore follows that these words are both adjectives and substantives at the same time, they are substantives because they denote an agent, they are adjectives, because they assign a certain qualification to the agent There are as many species of adjectives as there are species of qualities manners, and relations Qualities admit of intensity or remission One apple may be sour but another may have more of that quality, and hence in some languages a distinction is made of comparison, and that by degrees which sometimes are called the comparative and superlative degrees These degrees are expressed by an addition to the adjective, in English, as sour sourer, sourest, or by applying the words more and most, as more delightful, most delightful, the former method being generally used with adjectives of one or two syllables the latter when the syllables are more numerous from these different ways of expressing the same thing in the same language, it is evident that the confining of

tives to two degrees is unnecessary in the philosophy of language, and that it is probable there is some language in which this classification does not take place. This is, in fact the case in the Hebrew language, to which, of all others, the English approaches nearest in point of simplicity. English grammarians object to the use of double comparatives and superlatives, as improper: thus, more higher, most broadest, &c. are objectionable. The double superlative most highest, however, is a phrase peculiar to the old vulgar translation of the Psalms, where it acquires a singular propriety from the subject to which it is applied, the Supreme Being, who is indeed far higher than the highest. Adjectives that have in themselves a superlative signification admit not properly the superlative form superadded: thus, chiefest, and extremest, are objectionable. But poetry is in possession of these two improper superlatives, and may be indulged in the use of them. In our language, and indeed in most others, the caprice of custom often gets the better of analogy, and presents us with adjectives that are irregularly compared, as, good, better, best, bad, worse, worst. Worser and lesser, however, must be considered as vulgarisms which probably originated in the habit of terminating comparisons in *er*. Since adjectives express qualities, and therefore cannot be used without the substantives expressed or implied, we may see why participles should frequently be taken for, or seem to pass into the class of, adjectives. "A learned man is never esteemed by a man whose claim to distinction is founded on his wealth or his rank." In this sentence, learned may be considered as an adjective, because from long use the quality only is expressed without reference to time. From having learned, the man is supposed to possess a quality which distinguishes him from others, and this quality is seen when placed in opposition to others who have not had the same advantages. They are called rude, barbarous. Thus we say, "A rude man and a learned man are opposites," where rude is acknowledged at once to be an adjective, and learned is considered of the same class, because it is significant only of the quality without reference to time.

ADJECTIVELY. *ad.* After the manner of an adjective.

ADIEU. *ad.* (from *a Dieu*.) Farewell (*Prior*).

AD INQUIRENDUM, a judicial writ, commanding inquiry to be made of any thing touching a cause depending in the king's court, for the better execution of justice, as of bastardy, or the like.

To ADJOIN. *v. a.* (*adjoindre*, Fr. *adjungo*, Lat.) To join to, to unite to, to put to (*Watts*).

To ADJOIN. *v. n.* To be contiguous to (*Dryden*).

To ADJOURN. *v. a.* (*ajourner*, Fr.) 1. To put off to another day (*Bacon*). 2. To put off, to defer (*Dryden*).

ADJOURNMENT. *s.* (*ajournement*, Fr). 1. A putting off till another day (*L'Estrange*). 2. Delay, procrastination (*L'Estrange*). There is a difference between the adjournment and the prorogation of parliament, the former being done by the house itself, whereas the latter is an act of the king.

ADIPOCIRE, formed of *adeps*, fat, and *cera*, wax, a concrete animal oil, lately obtained from the soapy matter into which human bodies are converted after burial. On the opening of the pits (*fosses communes*) in which the corpses of the poor are deposited in the burial ground of the Innocens at Paris, during the years 1786 and 1787, for the purpose of laying out the ground to build upon, the coffins of several were opened, and the bodies examined by Fourcroy and Thouret: they were much shrunk, and flattened as if they had been strongly compressed; the linen which covered them adhered firmly, and upon being removed presented to view only irregular masses of a soft ductile greyish-white matter, apparently intermediate between fat and wax; the bones were very brittle. Where the conversion was complete, no trace of muscles, membranes, vessels, tendons, or nerves, was to be found: the whole contents of the abdominal cavity were wanting, the heart and other viscera of the thorax were dissolved; the brain, which was not wanting in any, had experienced the same change; but the hair appeared to have undergone no alteration. These conversions were effected in about three years; they are never observed, however, in those bodies that are interred singly, but always take place in the *fosses communes*: after which no farther alteration ensues for a long time: some of the pits, which had been closed more than forty years, being found to contain little else than a solid mass of soapy matter. From the analysis of this singular substance, it appears to be a true ammoniacal soap, composed of water, ammonia, and a concrete oil, the latter of which, on further investigation, was obtained pure, and is that to which the name adipocire is given. It is, when dry, brittle, combustible, waxy, crystallizable, and perfectly insoluble in water. When prepared by mixing well the soapy matter with twelve times its weight of warm water, and decomposing it by a slight excess of acetic or muriatic acid, which is the most effectual way of obtaining it pure, it contains much water between its particles, and is perfectly white. While it retains water, it is soft to the touch, and becomes ductile, like wax, by the warmth of the hand. By drying, it acquires a brownish-grey colour: if it be cooled slowly, it assumes a crystalline and lamellar texture, and very much resembles spermaceti: it is soluble in boiling alcohol, in the proportion of an ounce and a half to an ounce of the fluid. Dr. Gibbes has obtained adipocire from the matter formed in the receptacle for the bodies which are used for dissection by the anatomical professor at Oxford.

ADIPOSE MEMBRANE (*membrana*

adipora, from *adeps*, fat) The fat collected in the cells of the cellular membrane

ADIPOUS *a* (*adiposus*, Lat) Fat

ADIPPE, in entomology, a species of papilio

ADIPSIA (*adipsia*, from α neg and διψα, *thirst*) A want of thirst A genus of disease in the class locales, and order dysorexia of Cullen's nosology It is always symptomatic of some disease of the sensorium

ADIRATUS, a price or value set upon things stolen, as a recompence to the owner

ADIT, in general, signifies an approach to, or entrance of, any thing or place, as of a house, a theatre, &c

ADIT OF A MINE, the hole, or aperture, whereby it is entered and dug, and by which the water and ores are carried away The term amounts to the same with cuniculus or drift, and is distinguished from air-shaft The adit is usually made on the side of a hill, towards the bottom thereof, about four, five, or six feet high, and eight wide, in form of an arch, sometimes cut in the rock, and sometimes supported with timber, so conducted as that the sole or bottom of the adit may answer to the bottom of the shaft, only somewhat lower, that the water may have a sufficient current to pass away without the use of the pump This term is sometimes used for the air shaft itself, being a hole driven perpendicularly from the surface of the earth into some part of a mine, to give entrance to the air

ADITION *s* (*aditum*, Lat) The act of going to another

To ADJUDGE *v a* (*adjudico*, Lat) 1 To give the thing controverted to one of the parties by a judicial sentence (*Locke*) 2 To sentence to a punishment (*Shakspeare*) 3 To judge, to decree (*Knolles*)

To ADJUDICATE *v a* (*adjudico*, Lat) To adjudge

ADJUDICATION *s* (*adjudicatio*, Lat) The act of granting something to a litigant

ADIVE, in zoology, an animal of the jackal kind, being the canis aureus of Linneus

To ADJUGATE *v a* (*adjugo* Lat) To yoke to, to join to another by a yoke

ADJUMENT *s* (*adjumentum*, Lat) Help

ADJUNCT *s* (*adjunctum* Lat) Something adherent or united to another (*Swift*)

ADJUNCT *a* Immediately consequent (*Shakspeare*)

ADJUNCTION *s* (*adjunctio*, Lat) 1 The act of adjoining, or coupling together 2 The thing joined

ADJUNCTS, in rhetoric and grammar, signify certain words or things added to others, to amplify or augment the force of the discourse

ADJUNCTIVE *s* (*adjunctivus* Lat) 1 He that joins 2 That which is joined

ADJURATION *s* (*adjuratio*, Lat) 1 The act of proposing an oath to another 2 The form of oath proposed to another (*Addison*)

To ADJURE *v a* (*adjuro*, Lat) To impose an oath upon another, prescribing the form in which he shall swear (*Milton*)

To ADJUST *v a* (*ajuster*, Fr) 1 To regulate to put in order (*Swift*) 2 To make accurate (*Locke*) 3 To make conformable (*Addison*)

ADJUSTMENT *s* (*ajustement*, Fr) 1 Regulation the act of putting in method, settlement (*Woodward*) 2 The state of being put in method (*Watts*)

ADJUTAGE See AJUTAGE

ADJUTANT *s* A petty officer, whose duty is to assist the major, by distributing pay, and overseeing punishment In the cavalry, each regiment has an adjutant, in the infantry, each battalion he receives the orders every night from the brigade-major which after carrying them to the colonel, he delivers out to the serjeants

ADJUTANTS-GENERAL, among the Jesuits, a number of fathers who resided with the general of the order each of whom had a province or country assigned him, as England, Holland, &c and their business was to inform the father-general of state occurrences in such countries

To ADJUTE *v a* (*adjuto*, *adjutum*, Lat) To help, to concur not used (*Jonson*)

ADJUTOR *s* (*adjutor*, Lat) A helper

ADJUTORY *a* That does help

ADJUTRIX *s* She who helps

ADJUVANT *a* (*adjuvans*, Lat) Helpful, useful

To ADJUVATE *v a* (*adjuvo*, Lat) To help, to further, to put forward

ADLEGATION, a right claimed by the states of the German empire of adjoining plenipotentiaries, in public treaties and negotiations, to those of the emperor, for the transacting of matters which relate to the empire in general In this sense adlegation differs from legation, which is the right of sending ambassadors on a person's own account

ADLOCUTION, ADLOCUTIO, in antiquity, is chiefly understood of speeches made by Roman generals to their armies, to encourage them before a battle

ADMEASUREMENT *s* The act or practice of measuring according to rule

ADMEASUREMENT OF A DECREE See DECREE

ADMEASUREMENT ADMENSURATIO, in law a writ which lies for the bringing those to reason, or mediocrity, who usurp more of any thing than their share

ADMENSURATION *s* (*ad* and *mensura*, Lat) The act of measuring to each his part

ADMINICLE *s* (*adminiculum*, Lat) Help support, furtherance

ADMINICULAR *a* (from *adminiculum*, Lat) That gives help

ADMINICULES, among antiquaries, ornaments wherewith Juno is represented on medals

To ADMINISTER *v a* (*administro*, Lat) 1 To give, to afford, to supply (*Philips*) 2 To act as the minister or agent in any employment or office (*Pope*) 3 To distribute justice 4 To dispense the sacraments (*Hooker*) 5 To tender an oath (*Shakspeare*) 6 To give physick as it is wanted 7 To contribute, to bring supplies (*Spectator*) 8 To perform the office of an administrator

To ADMINISTRATE *v a* (*administro*, Lat) To give as physick not in use (*Woodward*)

ADMINISTRATION *s* (*administratio*, Lat) 1 The act of administering, or conducting any employment (*Shakspeare*) 2 The active or executive part of government (*Swift*) 3 Those to whom the care of publick affairs is committed 4 Distribution, exhibition, dispensation (*Hooker*)

ADMINISTRATIVE *a* (from *administrate*) That does administer

ADMINISTRATOR *s* (*administrator*, Lat) 1 He that has the goods of a man dying intestate committed to his charge (*Cowell*) 2 He that officiates in divine rites (*Watts*) 3 He that conducts the government (*Swift*)

ADMINISTRATOR, in law, he to whom the ordinary commits the administration of the goods of a person deceased, in default of an executor An action lies for or against an administrator, as for or against an executor, and he shall be accountable to the value of the goods of the deceased, and no further, unless there be waste, or other abuse, chargeable on him If the administrator die, his executors are not administrators, but the court is to grant a new administration If a stranger, who is neither administrator nor executor, take the goods of the deceased, and administer, he shall be charged, and sued as an executor, not as an administrator The origin of administrators may be traced to the civil law

ADMINISTRATORSHIP *s* (from *administrator*) The office of administrator

ADMINISTRATRIX, a female administrator or She who hath goods and chattels of an intestate committed to her charge, as administrator

ADMIRABLE *a* (*admirabilis*, Lat) To be admired, of power to excite wonder (*Sidney*)

ADMIRABLENESS, ADMIRABILITY *s* (from *admirable*) The quality or state of being admirable

ADMIRABLY *ad* (from *admirable*) In an admirable manner (*Addison*)

ADMIRAL, in a general sense, an officer of high naval rank, who usually commands a fleet or squadron of ships of war Anciently there were generally three or four admirals appointed in the English seas, all of them holding the office durante bene placito, and each of them having particular limits under their charge and government as admirals of the fleet of ships, from the mouth of the Thames, northward, southward or westward Before the word admiral was adopted the title of custos maris was made use of Authors are divided with regard to the origin and denomination of this important officer, whom we find established in most kingdoms that border on the sea But the most probable opinion is that of sir Henry Spelman, who thinks, that both the name and dignity were derived from the Saracens, and, by reason of the holy wars, brought amongst us, for admiral, in the Arabian language, signifies a prince, or chief ruler, and was the ordinary title of the governors of cities, provinces, &c and therefore they called the commander of the navy by that name, as a name of dignity and honour And indeed there are no instances of admirals in this part of Europe before the year 1284, when Philip of France, who attended St Louis in the wars against the Saracens created an admiral Du Cange assures us that the Sicilians were the first, and the Genoese the next, who gave the denomination of admiral to the commanders of their naval armaments, and that they took it from the Saracen or Arabic emir, a general name for every commanding officer * As for the exact time when the word was introduced among us, it is uncertain some think it was in the reign of Edward I Sir Henry Spelman is of opinion that it was first used in the reign of Henry III because neither the laws of Oleron made in 1266 nor Bracton, who wrote about that time, make any mention of it, and that the term admiral was not used in a charter in the eighth of Henry III wherein he granted this office to Richard de Lucy, by these words, maritimam Angliæ, but in the fifty sixth year of the same reign, not only the historians but the charters themselves, very frequently use the word admiral

Lord High Admiral of England an office of so great power and trust, that it has been thought expedient in modern times to place it in the hands of a body of commissioners, who have a kind of president under the title of first lord of the admiralty Their jurisdiction is exercised over all matters of naval concern whatever

Lord High Admiral of Scotland one of the great officers of the crown, and supreme judge in all maritime cases within that part of Britain

ADMIRAL, also implies the commander in chief of any single fleet or squadron or in general, any flag officer whatever The commander of a fleet carries his flag at the main-top-mast head

Vice Admiral, is the commander of the second squadron and carries his flag at the fore-top-mast head

Rear Admiral is the commander of the third squadron, and carries his flag at the mizen-top mast head

The rank of an admiral and his station in the line are also indicated by the colour of his flag Hence there are admirals, vice admirals, and rear admirals, of the white, of the blue, &c

ADMIRAL, is also an appellation given to the most considerable ship of a fleet of merchantmen, or of the vessels employed in the cod fishery of Newfoundland

ADMIRAL, in conchology, the name of a beautiful shell of the volute kind, much admired by the curious There are four species of this shell, viz the grand-admiral the vice-admiral, the orange-admiral, and the extra-admiral The first is extremely beautiful, of an elegant white enamel, variegated with bands of yellow, which represent in some measure, the colour of the flags in men of war It is of a very curious shape, and finely turned about the head, the clavicle being exerted, but its distinguishing character is a denticulated line, running along the centre of the large yellow band, by this it is distinguished from the vice-admiral, the head of which is also less elegantly formed The orange-admiral has more yellow than any of the others, and the bands of the extra-admiral run into one another

ADMIRALSHIP s The office of admiral

ADMIRALTY, the office of lord high-admiral, whether discharged by one single person, or by joint commissioners, called lords of the admiralty

Court of Admiralty, a sovereign court, held by the lord high-admiral or lords of the admiralty, where cognizance is taken of all maritime affairs All crimes committed on the high-seas, or on great rivers below the first bridge next the sea are cognizable in this court only, and before which they must be tried by judge and jury But in civil cases the mode is different, the decision being all made according to the civil law In case any person is sued in the admiralty court, contrary to the statutes, he may have the writ of supersedeas to stop further proceedings and also an action for double damages against the person suing Subordinate to this court there is another of equity called court-merchant, wherein all causes between merchants are decided, agreeably to the rules of the civil law

ADMIRALTY ISLANDS, a cluster of islands in the South Pacific Ocean, to the NW of New Ireland Some of them appear of considerable extent the centre one lies in about Lat 2 18 S Lon 146 44 E

ADMIRATION s Is defined by Mr Grove, to be that sudden surprise at the novelty of an object by which the soul is fastened down to the contemplation of it He also asserts, that, according to the different character of its object, it is called esteem, or contempt Indeed much ambiguity attends the precise signification of this word sometimes it is used to denote surprise, at others, wonder, sometimes it is applied to subjects as a mark of degradation, at others, as expressive of excellencies But in the most pertinent and appropriate use of the terms to admire, and admiration, they are manifestly deviating from a generic to a specific sense, and in proportion, says Dr Cogan, to our advances in precision and accuracy, we feel not only the advantage, but the necessity of applying them to some kind of excellency exclusively, otherwise we shall be destitute of words to discriminate the finest feelings of the soul, from those which are common to the most ignorant and uncultivated Even ideots may be surprised the most ignorant may wonder, and frequently do wonder the most, but neither of them is susceptible of that impression which is best expressed by admiration If we adhere steadfastly to the rule, that no two words are perfectly synonymous which cannot be used with equal propriety in every possible connection we shall find that admiration is as superior to surprise and wonder simply considered, as knowledge is superior to ignorance For its appropriate signification is "that act of the mind by which we discover, approve, and enjoy, some unusual species of excellence Cogan on the Passions, p 147

To ADMIRE v a (*admiror*, Lat) 1 To regard with wonder (*Glanville*) 2 To regard with love

To ADMIRE v n To wonder (*Ray*)

ADMIRER s (from *admire*) 1 The person that wonders, or regards with admiration (*Addison*) 2 A lover

ADMIRINGLY ad (from *admire*) With admiration (*Shakspeare*)

ADMISSIBLE a (*admitto*, *admissum*, Lat) That may be admitted (*Hale*)

ADMISSION s (*admissio* Lat) 1 The act or practice of admitting (*Bacon*) 2 The state of being admitted (*Dryden*) 3 Admittance, the power of entering (*Woodward*) 4 The allowance of an argument

To ADMIT v a (*admitto*, Lat) 1 To suffer to enter (*Pope*) 2 To suffer to enter upon an office (*Clarendon*) 3 To allow an argument or position (*Fairfax*) 4 To allow, or grant, in general (*Dryden*)

ADMITTABLE a (from *admit*) That may be admitted (*Ayliffe*)

ADMITTANCE s (from *admit*) 1 The act of admitting, permission to enter 2 The power or right of entering (*Locke*) 3 Custom out of use (*Shakspeare*) 4 Concession of a position (*Brown*)

ADMITTENDO CLERICO, is a writ granted to him who hath recovered his right of presentation against the bishop in the common pleas

ADMITTENDO IN SOCIUM, is a writ for the association of certain persons to justices of assize formerly appointed

To ADMIX v a (*admisceo*, Lat) To mingle with something else

ADMIXTION s (from *admix*) The union of one body with another (*Bacon*)

ADMIXTURE s (from *admix*) The body mingled with another (*Woodward*)

To ADMONISH v a (*admoneo*, Lat) To warn of a fault, to reprove gently (*Dryden*)

ADMONISHER s (from *admonish*) The person that puts another in mind of his faults or duty (*Dryden*)

ADMONISHMENT s (from *admonish*) Admonition, notice of faults or duties (*Shakspeare*)

ADMONITION s (*admonitio*, Lat)

The hint of a fault or duty, counsel, gentle reproof (*Hooker*)

ADMONITION, in church history, a part of discipline, which consists chiefly in warning an offender of the irregularities he is guilty of and advising him to amend By the ancient canons, nine admonitions were required before excommunication

ADMONITIONER s (from *admonition*) A general adviser A ludicrous term (*Hooker*)

ADMONITORY *a* (*admonitorius*, Lat) That does admonish (*Hooker*)

ADMORTIZATION, in the feudal customs, the reduction of the property of lands or tenements to mortmain

ADMOVE *v a* (*admoveo*, Lat) To bring one thing to another

ADMURMURATION *s* The act of murmuring to another

ADNATA TUNICA (*adnata*, from *adnascor*, to grow to) Albuginea oculi Tunica albuginea oculi This membrane is mostly confounded with the conjunctive It is, however, thus formed five of the muscles which move the eyes take their origin from the bottom of the orbit, and the sixth arises from the edge of it, they are all inserted by a tendinous expansion into the anterior part of the tunica sclerotica, which expansion gives the whiteness peculiar to the fore part of the eye It lies betwixt the sclerotica and conjunctiva

ADNATE In botany, adjoined, adhering fastened, fixed or growing to As the offsets, or small bulbs, produced from the main bulb, and closely adjoining to it, in narcissus, &c The leaf, adhering to the stem or branch by the surface or disk itself The petiole The stipule, fixed to the petiole, and opposed to solute, loose, detached, as in rose, bramble potentilla, &c The anther The style, adhering to the corol, as in canna

ADNOUN, is used by some grammarians to express what is more usually called an adjective

ADO s (from the verb *to do*, with *a* before it, as the French *affaire*, from *a* and *faire*) 1 Trouble, difficulty (*Sidney*) 2 Bustle, tumult, business (*Locke*) 3 More tumult and show of business than the affair is worth (*L'Estrange*)

ADOLESCENCE ADOLESCENCY *s* (*adolescentia*, Lat) The age succeeding childhood, and succeeded by puberty (*Brown*) It is commonly computed to be between fifteen and twenty-five, or even thirty years of age, though in different constitutions its terms are very different The Romans usually reckoned it from twelve to twenty-five in boys, and to twenty one in girls, & And yet, among their writers juvenis and adolescens are frequently used indifferently, for any person under forty five years

ADONAI, one of the names of the Supreme Being in the Scriptures The Jews, who either out of respect or superstition, do not pronounce the name of Jehovah read Adonai in the room of it, as often as they meet with Jehovah in the Hebrew text But the ancient Jews were not so scrupulous

ADONIA, in antiquity, solemn feasts in honour of Venus, and in memory of her beloved Adonis The Adonia were observed with great solemnity by most nations, Greeks, Phœnicians, Lycians, Syrians, Egyptians, &c. They lasted two days, and were chiefly celebrated by the women

ADONIC, a sort of verse used by the Greek and Latin poets, consisting of two feet, the first of which is a dactyle, and the second a spondee, or trochee It was originally used in the lamentations for the death of Adonis, and from that circumstance acquired its name Its principal use among the poets, however, is only as a conclusion to the Sapphic verse, as in the following

Scandit æratas vitiosa naves
Cura, nec turmas equitum relinquit
Ocyor cervis & agente nimbos
Ocyor Euro

HORAT

ADONIDES, an appellation given to such botanists as have given descriptions or catalogues of the plants cultivated in some particular place

ADONIS, son of Cinyras, by his daughter Myrrha, was the favourite of Venus He was fond of hunting, and was often cautioned by his mistress not to hunt wild beasts, for fear of being killed in the attempt This advice he slighted and at last received a mortal bite from a wild boar which he had wounded, and Venus, after shedding many tears at his death, changed him into a flower called anemony Proserpine is said to have restored him to life, on condition that he should spend six months with her, and the rest of the year with Venus This implies the alternate return of summer and winter Some writers say, Mars transformed himself into a wild boar, and struck Adonis in the groin with his tusk, and thus caused his death

ADONIS (ἀδωνις, from אדן *adon*, Heb) The herb pheasant's-eye so named because it was fabled that Adonis was changed into this flower by Venus, after having been slain by a boar The Adonis is a genus in the Linnean class and order polyandria polygynia calyx five-leaved, petals from five to eight, or more, without the nectariferous pore at the base seeds naked It is common to Europe and Africa in several of its species, the whole of which amount to eight The autumnalis, is the wild pheasant's eye of our own corn fields

ADONISTS, a sect or party, among divines and critics, who maintain, that the Hebrew points ordinarily annexed to the consonants of the word Jehovah, are not the natural points belonging to that word, nor express the true pronunciation of it, but are the vowel-points, belonging to the words Adonai and Elohim, applied to the consonants of the ineffable name Jehovah, to warn the readers, that instead of the word Jehovah, which the Jews were forbid to pronounce, and the true pronunciation

of which had been long unknown to them, they are always to read Adonai

To ADOPT *v a* (*adopto*, Lat) 1 To take a son by choice, to make him a son, who was not so by birth (*Dryden*) 2 To place any person or thing in a nearer relation to something else (*Locke*)

ADOPTEDLY *ad* (from *adopted*) After the manner of something adopted (*Shakspeare*)

ADOPTER *s* (from *adopt*) He that gives some one by choice the rights of a son

ADOPTER, in chemistry, a vessel of a globular form, placed between a retort and a receiver, and serving to increase the length of the neck of the former The adopter has two mouths or apertures opposite to each other, one of which admits the neck of the retort, and the other is received either by the mouth of another adopter, or into the mouth of the receiver

ADOPTIANA, in church history, heretics in the eighth century, who held that Jesus Christ is the son of God, not by nature, but by adoption

ADOPTION, an act, whereby any person takes another into his family, owns him for his son, and appoints him for his heir The custom of adoption was common among the Romans, yet it was not practised, but for certain causes expressed in the laws, and with certain formalities usual in such cases they first learnt it from the Greeks This adoption was a sort of imitation of nature, intended for the comfort of those who had no children, therefore he that was to adopt was to have no children of his own, and to be past the age of getting any, nor were eunuchs allowed to adopt, as being under an actual impotency of begetting children, neither was it lawful for a young man to adopt an elder because that would have been contrary to the order of nature nay, it was even required that he who adopted should be at least eighteen years older than his adopted son, that there might appear a probability of his being the natural father Adoption is also applied to the passion of our Saviour, and the communication of the merits of his death, which being applied to us by baptism, we become the adopted children of God and have a part in the inheritance of heaven This is the doctrine taught by St Paul in several places, particularly in Rom viii 15 Gal iv 15

ADOPTIVE *a* (*adoptivus*, Lat) 1 That is adopted by another (*Bacon*) 2 That does adopt another (*Ayliffe*)

ADORABLE *a* (*adorable*, Fr) That ought to be adored, worthy of divine honours (*Cheyne*)

ADORABLENESS *s* (from *adorable*) Worthiness of divine honours

ADORABLY *ad* (from *adorable*) In a manner worthy of adoration

ADORATION, the act of rendering divine honours, or of addressing God, or a being as supposing it a god (See WORSHIP) The word is compounded of *ad*, *to* and *os*, *mouth*, and literally signifies to apply the hands to the mouth, *manum ad os admovere*, q d *to kiss the hand*, this being, in the eastern countries, one of the great marks of respect and submission The Romans practised adoration at sacrifices and other solemnities, in passing by temples, altars, groves, &c, at the sight of statues, images, or the like, whether of stone or wood, wherein any thing of divinity was supposed to reside Usually there were images of the gods placed at the gates of cities, for those who went in or out, to pay their respects to The ceremony of adoration among the ancient Romans was thus The devotee having his head covered, applied his right hand to his lips, the fore finger resting on his thumb, which was erect, and thus bowing his head, turned himself round from left to right The Jewish manner of adoration was by prostration, bowing and kneeling The Christians adopted the Grecian rather than the Roman method, and adored always uncovered The ordinary posture of the ancient Christians was kneeling, but on Sundays standing, and they had a peculiar regard to the East, to which point they ordinarily directed their prayers

ADORATION is more particularly used for the act of preferring our requests or thanksgivings to Almighty God It is also used for certain extraordinary civil honours or respects which resemble those paid to the deity, yet are given to men The practice of adoration, though highly unbecoming in one human being towards another, is still subsisting in England in the ceremony of kissing the king's or queen's hand and in serving them at table, both being performed kneeling

ADORATION is more particularly used for kissing one's hand in presence of another, as a token of reverence The Jews adored by kissing their hands and bowing down their heads, whence, in their language, kissing is properly used for adoration

ADORATION is also used, in the court of Rome, for the ceremony of kissing the pope's feet It is said of Dioclesian, that he had gems fastened to his shoes that divine honours might be more willingly paid him, by kissing his feet The like usage was afterwards adopted by the popes, who finding a vehement disposition in the people to fall down before them and kiss their feet, had crucifixes fastened on their slippers, by which the adoration intended for the pope's person is supposed to be transferred to Christ

ADORATION, *perpetual* is a kind of society or association of devout persons established in Romish countries, who take their turns to pray before the eucharist, regularly relieving each other, so that the service never ceases day nor night

To ADORE *v a* (*adoro* Lat) To worship with external homage (*Dryden*)

ADORER *s* (from *adore*) He that adores, a worshipper (*Prior*)

To ADORN *v a* (*adorno*, Lat) 1 To dress, to deck the person with ornaments (*Cowley*) 2 To set out any place or thing

with decorations (*Cowley*) 3 To embellish with oratory (*Sprat*)

ADORNMENT s (from *adorn*) Ornament, embellishment not in use (*Raleigh*)

ADOUR, a river of France which rises in the mountains of Bigorre, and falls into the bay of Biscay

ADOWN *ad* (from *a* and *down*) Down, on the ground (*Spenser*)

ADOWN *prep* Toward the ground

ADOXA Tuberose moschatell, or hollow-root A genus of the Linnæan class and order octandria tetragynia thus characterised calyx two or three cleft, half inferior corol four or five cleft, superior capsule four or five celled, invested with the calyx One species only is known, which is common to the woods of our own country

AD PONDUS OMNIUM The weight of the whole These words are inserted in pharmaceutical preparations or prescriptions when the last ingredient ought to weigh as much as all the others put together

ADPRESSUS, in botany denotes contiguous, pressed to, or laid to

ADQUISTA See PROSLAMBANOMENOS

AD QUOD DAMNUM, a writ directed to the sheriff, commanding him to inquire what hurt may befal the king by granting a fair, or market, in any town, or place The same writ also issues for an inquiry to be made of what the king, or other person, may suffer, by granting lands in fee simple to a convent, chapter, or other body politic, by reason such land falls into mortmain

ADRACANTHUS, or ADRACANTHIGUM See TRAGACANTH

ADRAMMELECH, one of the gods of the inhabitants of Sepharvaim, who were settled in the country of Samaria, in the room of those Israelites who were carried beyond the Euphrates The Sepharvaites made their children pass through fire, in honour of this idol and another called Anamelech It is supposed, that Adrammelech meant the sun, and Anamelech the moon the first signifies the magnificent king the second the gentle king

ADRAMYTTIUM a famous city of Mysia Major, called also Pedasus which, according to Strabo, was an Athenian colony with a harbour and dock, situate at the foot of mount Ida, near the Caicus It was so called from Adramitus, the brother of Crœsus, by whom it was built

ADRASTEA, in antiquity, an epithet given to the goddess Nemesis or Revenge

ADRASTIA CERTAMINA, a kind of Pythian games instituted at Sicyon, in honour of Apollo

ADRASTIA, in Troas, Asia, so called from Adrastus, who built it it was famous for the temple of Nemesis and the oracle of Apollo Lat 39 40 N Lon 28 30 E

ADRASTIA, a daughter of Jupiter and Necessity She is called by some Nemesis, and is the punisher of injustice The Egyptians placed her above the moon, whence she looked down upon the actions of men

ADRASTUS, king of Argos, son of Talaus and Lysianassa, daughter of Polybus, king of Sicyon, acquired great honour in the famous war of Thebes, in support of Polynices his son-in-law, who had been excluded the sovereignty of Thebes by Eteocles his brother, notwithstanding their reciprocal agreement Adrastus, followed by Polynices and Tydeus, his other son in-law, by Capaneus and Hippomedon his sister s sons, by Amphiaraus his brother in-law and by Parthenopæus, marched against the city of Thebes, and this is the expedition of the Seven Worthies, which the poets have so often sung They all lost their lives in this war, except Adrastus, who was saved by his horse called Arion This war was revived ten years after by the sons of those deceased warriors, which was called the war of the Epigones, and ended with the taking of Thebes None of them lost their lives, except Ægialeus son of Adrastus, which afflicted him so much, that he died of grief in Megara, as he was leading back his victorious army

ADREAD *ad* (from *a* and *dread*) In a state of fear obsolete (*Spenser*)

ADRIAN, the fifteenth emperor of Rome, is represented as a learned, warlike, and austere general * He came to Britain where he built a wall between the modern towns of Carlisle and Newcastle, 60 miles long, to protect the Britons from the incursions of the Caledonians He killed in battle 500,000 Jews who had rebelled, and built a city on the ruins of Jerusalem which was called Ælia His memory was so retentive that he remembered every incident of his life and knew all the soldiers of his army by name In the beginning of his reign, he followed the virtues of his adopted father and predecessor Trajan he remitted all arrears due to his treasury for sixteen years, and publicly burnt the account books, that his word might not be suspected It is said that he wished to enrol Christ among the gods of Rome, but his apparent lenity towards the Christians was disproved, by the erection of a statue to Jupiter on the spot where Jesus rose from the dead, and one to Venus on mount Calvary He died of a dysentery at Baiæ, A D 138, in the 63d year of his age, after a reign of 21 years On his death-bed he composed some Latin verses, addressed to his soul, which betray the uncertainty he was in with regard to a future state and present a striking contrast to the tranquil confidence of Addison

> Animula, vagula blandula,
> Hospes, comesque corporis,
> Quæ nunc abibis in loca,
> Pallidula, rigida, nudula?
> Nec, ut soles, dabis jocos

Thus beautifully imitated by Prior

> Poor little, pretty fluttering thing,
> Must we no longer live together?
> And dost thou prune thy trembling wing
> To take thy flight, thou know'st not
> whither?

Thy humorous vein, thy pleasing folly,
Lies all neglected, all forgot
And pensive, wav'ring, melancholy,
Thou dread'st and hop'st, thou know'st not what

The translation of Pope is as follows

Ah! fleeting spirit! wand'ring fire,
That long has warm'd my tender breast,
Must thou no more this frame inspire?
No more a pleasing cheerful guest!
Whither, ah, whither art thou flying?
To what dark undiscover'd shore?
Thou seem'st all trembling, shiv'ring, dying,
And wit and humour are no more!

ADRIAN IV (Pope,) the only Englishman who ever had that dignity, was born at Langley, near St Alban's His name was Nicholas Brekespere and he was some time at the monastery of St Alban's in a low condition Being refused the habit in that house, he went to France, and became a clerk in the monastery of St Rufus, in Provence of which he was afterwards chosen abbot, but the monks not liking his government, complained of him to pope Eugenius III who was so pleased with him, that he took him under his patronage, and made him cardinal bishop of Alba in 1146 In 1148, that pope sent him legate to Denmark and Norway, which nations he converted to the Christian faith In 1154, he was chosen pope, and took the name of Adrian, on which, Henry II king of England, sent the abbot of St Alban's with three bishops to congratulate him The pope disregarding the slight formerly put upon him, granted considerable privileges to the monastery of St Alban's, and a bull to Henry for the conquest of Ireland In 1155, he excommunicated William, king of Sicily, for ravaging the territories of the church and about the same time, the emperor Frederic meeting the pope near Sutrium, held his stirrup while he mounted on horseback, after which his holiness conducted him to Rome and consecrated him king of the Romans, in St Peter's church The next year the king of Sicily submitted and was absolved Adrian, by his active conduct, left the papal territory in a better state than he found it, and died, not without suspicion of poison, September 1, 1159 and was buried in St Peter's church near his predecessor Eugenius (*Watkins's Dict*)

ADRIANISTS, in ecclesiastical history a sect of heretics, divided into two branches The first were disciples of Simon Magus, and flourished about the year 34 The second were the followers of Adrian Hamstead, the baptist, and held some particular errours concerning Christ

ADRIANOPLE, a large city of Turkey in Europe, in the province of Romania It is the see of an archbishop It has been called Arestes, Orestias, and Uscudama its present name was given it by the emperor Adrian, who repaired it in the year 122 Lat 41 42 N Long 26 31 E

ADRIATIC SEA, a gulf of the Mediterranean Sea, between Greece and Italy extending from Lat 40 to 45 55 N There are many islands in it, and many bays on each coast It is often called the Gulf of Venice

ADRIFT *ad* Floating at random

ADROGATION, in antiquity, a species of adoption, whereby a person who was capable of choosing for himself, was admitted by another into the relation of a son

ADROIT *a* (French) Dexterous, active, skilful (*Ferras*)

ADROITNESS *s* (from *adroit*) Dexterity, readiness, activity

ADRY *ad* (from *a* and *dry*) Athirst thirsty

ADSCITITIOUS *a* (*ascitus*, Lat) That is taken in to complete something, additional

ADSELLATION (*adsellatio*, from *adsello*, to go to stool) The act of evacuating the abdominal fæces

ADSIDELIA, in antiquity, the table at which the flamens sat during the sacrifice

ADSTRICTION *s* (*adstrictio*, Lat) The act of binding together

ADSTRINGENTS (*adstringentia, medicamenta* from *ad*, and *stringo*, to bind) Astringents In medicine, those substances which possess a power of condensing the animal fibre To the taste they impart a sense of dryness, and a remarkable corrugation in the parts on which they immediately act

AD TERMINUM QUI PRÆTERIIT in law, a writ of entry which lies for the lessor or his heirs, if after the expiration of a lease, whether it be for years or life, the lessee, or other occupier of the land, &c refuses to quit the premises

ADUACA (Antonine), or ATUACA, contracted from Atuacuca (Cæsar), anciently a large and famous city of the Tungri, now a small and inconsiderable village, called Tongeren, in the bishopric of Liege, to the north-west of the city of Liege in the territory of Haspengow, on the rivulet Jecker, that soon after falls into the Maese Long 5 25 Lat 50 51

To ADVANCE *v a* (*avancer*, Fr) 1 To bring forward, in the local sense (*Pat I*) 2 To raise to preferment, to aggrandize (*Esth*) 3 To improve (*Tillotson*) 4 To heighten, to grace (*South*) 5 To forward, to accelerate (*Bacon*) 6 To propose, to offer to the publick (*Dryden*)

To ADVANCE *v n* 1 To come forward (*Parnel*) 2 To make improvement (*Locke*)

ADVA'NCE *s* (from the verb) 1 The act of coming forward (*Clarendon*) 2 A tendency to come forward to meet a lover, an act of invitation (*Walsh*) 3 Gradual progression, rise from one point to another (*Atterbury*) 4 Improvement, progress toward perfection (*Hale*) 5 Money paid before goods are delivered, or work done

ADVANCED DITCH, or moat, in fortification is that drawn round the glacis or esplanade of a place

ADVANCED-GUARD, or VANGUARD, in the art of war, denotes the first line or division

of an army, ranged or marching in order of battle, or it is that part which is next the enemy, and marches first towards them

ADVANCED-GUARD is more particularly used for a small party of horse stationed before the main-guard

ADVANCEMENT *s* (*avancement*, Fr) 1 The act of coming forward (*Swift*) 2 The state of being advanced, preferment (*Shakspeare*) 3 The act of advancing another (*Shakspeare*) 4 Improvement (*Brown*)

ADVANCER *s* (from *advance*) A promoter, a forwarder (*Bacon*)

ADVANTAGE *s* (*avantage* Fr) 1 Superiority (*Sprat*) 2 Superiority gained by stratagem (*Spenser*) 3 Opportunity, convenience (*Shakspeare*) 4 Favourable circumstance (*Waller*) 5 Gain, profit (*Tol*) 6 Overplus, something more than the mere lawful gain (*Shakspeare*) 7 Preponderation on one side of the comparison

To ADVANTAGE *v a* (from the noun) 1 To benefit (*Locke*) 2 To promote to bring forward (*Glanville*)

ADVANTAGEABLE *a* (from *advantage*) Profitable, convenient, gainful (*Hayward*)

ADVANTAGED *a* (from the verb) Possessed of advantages (*Glanville*)

ADVANTAGE GROUND *s* Ground that gives superiority and opportunities of annoyance or resistance (*Clarendon*)

ADVANTAGEOUS *a* (*avantageux*, Fr) Profitable, useful opportune (*Hammond*)

ADVANTAGEOUSLY *ad* (from *advantageous*) Conveniently, opportunely profitably (*Arbuthnot*)

ADVANTAGEOUSNESS *s* (from *advantageous*) Profitableness, usefulness, convenience (*Boyle*)

ADUAR in the Arabian and Moorish customs, a kind of ambulatory village, consisting of tents which these people remove from one place to another

To ADVENE *v n* (*advenio* Lat) To accede to something, to be superadded (*Ayliffe*)

ADVENIENT *a* (*adveniens*, Lat) Advening, superadded (*Glanville*)

ADVENT, ADVENTUS, in the calendar the time immediately preceding Christmas, and was anciently employed in pious preparation for the adventus, or coming on of the feast of the Nativity Advent includes four Sundays, or weeks, commencing either with the Sunday which falls on St Andrew's day, namely the 30th day of November or the nearest Sunday to that day, either before or after

ADVENTINE *a* (from *adventu adventum*, Lat) Adventitious that which is extrinsically added Not in use (*Bacon*)

ADVENTITIA COENA, in antiquity, an entertainment made to welcome a person on his return from a journey

ADVENTITIOUS *a* (*adventitius* Lat) That does advene, accidental, supervenient, extrinsically added (*Boyl Dryden*)

ADVENTIVE *s* (from *advenio*, Lat) The thing or person that comes from without not in use (*Bacon*)

AD VENTREM INSPICIENDUM, in law, a writ commanding a woman to be searched, whether she be with child by a former husband, on her withholding of lands from the next failing issue of her own body It is also ordered when a woman pleads pregnancy against the execution of the sentence of death

ADVENTUAL *a* (from *advent*) Relating to the season of advent (*Bishop Sanderson*)

ADVENTURE *s* (French) 1 An accident, a chance a hazard (*Hayward*) 2 An enterprise in which something must be left to hazard (*Dryden*)

ADVENTURE *Bill of* a writing testifying the goods mentioned in it to be shipped on board a certain vessel belonging to another person, who is to run all hazards

ADVENTURE ISLAND, a small island in the Pacific ocean it is situated according to the requisite tables nearly in lat 17 5 S Long 144 18 W

To ADVENTURE *v n* (*aventurer*, Fr) 1 To try the chance, to dare (*Shakspeare*) 2 In an active sense, to put into the power of chance (*Judges*)

ADVENTURER *s* (*aventurier*, Fr) He that seeks occasions of hazard, he that puts himself into the hands of chance (*Spenser*)

ADVENTURERS, an ancient company of merchants and traders, erected for the discovery of lands trades &c unknown

ADVENTURESOME *a* (from *adventure*) The same with ADVENTUROUS A low word

ADVENTURESOMENESS *s* (from *adventuresome*) The quality of being adventuresome

ADVENTUROUS *a* (*aventureux*, Fr) 1 Inclined to adventures bold, daring, courageous (*Dryden*) 2 Full of hazard, dangerous (*Addison*)

ADVENTUROUSLY *ad* (from *adventurous*) Boldly, daringly (*Shakspeare*)

ADVERB *s* (*adverbium*, Lat) A word joined to a verb or adjective, and solely applied to the use of qualifying and restraining the latitude of their signification (*Clarke*) Not that the adverb is confined purely to the verbs, but because that is its most ordinary use Whence it becomes so denominated κατ' ἐξοχην We frequently find it joined to adjectives, and sometimes even to substantives, particularly where those substantives signify an attribute, or quality of the thing spoken of, v gr he is very sick, he is truly king An adverb is likewise joined sometimes to another adverb to modify its meaning, v gr very devoutly, &c Whence some grammarians choose rather to call adverbs modificatives, comprising under this one general term, adverbs conjunctions, prepositions, and even adjectives Adverbs are very numerous but they may be reduced under the general classes of adverbs of

time, of place, of order, of quantity, of quality, of manner, of interrogation, of affirmation, of denegation, of diminution, of doubting, of exception, and of comparison. We cannot help considering it as unfortunate, however, that in all languages a number of words is placed in the class of adverbs, which strike the observer, at first sight, to be compound words. Thus, notwithstanding, in the English, cependant, in the French, are evidently compounds. While is a substantive, meaning time, as is ἄλ of the Greeks. Wisely is a compound of two adjectives, and we may say "he speaks wisely," or "he speaks like a wise man" indifferently, the use of the adverb as it is called giving conciseness only to the expression. This class of words was formed from the ignorance of the parts in every compound, thus if instead of like a wise man, we translate the phrase into Latin, and use the word sapienter this sapienter is immediately classed as an adverb, or something distinct from the adjective or verb, yet the er has probably the same force with the *ly* in English. We may modify the quality expressed by a verb or a noun various ways. A high mountain may be called "an exceedingly high mountain," where exceedingly is applied to high, high like exceeding, namely, most mountains we know. He suffers patiently, namely, like a patient man. "While the country was alarmed, &c." While is called an adverb, but it is a substantive, and we frequently say, "all the while," i.e. "all the time:" while, therefore, means during the time. Really is like real men, and is in opposition to pretended. Hence, then, wherever this class is admitted, the student should endeavour to learn the force of the word, not by fanciful modifications of verbs and adjectives in a variety of senses, but by learning the real meaning of the word.

ADVERBIAL. *a* (*adverbialis*, Lat.) That has the quality or structure of an adverb.

ADVERBIALLY. *ad.* (*adverbialiter*, Lat.) In the manner of an adverb (*Addison*).

ADVERSABLE. *a.* (from *adverse*.) Contrary to; opposite to.

ADVERSARIA, among the ancients, a book of accounts, somewhat like our journals or daybooks.

ADVERSARIA, is also a title given to divers books containing collection of miscellaneous remarks, &c.

ADVERSARIA, is likewise used for a commentary on some text or writing.

ADVERSARY. *s.* (*adversaire*, Fr. *adversarius*, Lat.) An opponent, antagonist, enemy (*Shakspeare*).

ADVERSATIVE. *a.* (*adversativus*, Lat.) A word which makes some opposition or variety. Thus in the phrase, he is a clever fellow, but a great rascal, the word but is an adversative conjunction. Mr. H. Tooke has shown, in his Ἔπεα Πτερόεντα, that there are two senses to the word but, in the first it is a corruption of bot, the imperative of the Saxon verb botan, to boot, superadd or supply, and in the second, it is a contraction of be utan to be out, in illustration of this theory is given the following couplet:

"But thy work shall endure in laude and glorie,
But spot or faulte condigne eterne memorie."

The meaning is "superadd (to something said before) thy work shall endure in laude and glorie be out or without spot or faulte."

ADVERSATOR, in antiquity, a servant who attended the rich in returning from supper, to give them notice of any obstacles in the way, at which they might be apt to stumble.

ADVERSE. *a.* (*adversus*, Lat.) 1. Acting with contrary directions (*Milton*). 2. Calamitous, afflictive, pernicious: opposed to prosperous (*Roscommon*). 3. Personally opponent (*Sidney*).

ADVERSELY. *ad.* (from *adverse*.) Oppositely, unfortunately (*Shakspeare*).

ADVERSITY. *s.* (*adversité*, Fr.) 1. Affliction, calamity, the cause of sorrow, misfortune (*Shakspeare*). 2. The state of unhappiness, misery (*Shakspeare*).

To ADVERT. *v. n.* (*adverto*, Lat.) To attend to, to regard, to observe (*Ray*).

ADVERTENCE. ADVERTENCY. *s.* (from *advert*.) Attention, regard, consideration, heedfulness (*Decay of Piety*).

To ADVERTISE. *v. a.* (*advertir*, Fr.) 1. To inform another, to give intelligence. 2. To give notice of any thing in the publick prints.

ADVERTISEMENT, or ADVERTISEMENT. *s.* (*avertissement*, Fr.) 1. Instruction, admonition (*Shakspeare*). 2. Intelligence, information (*Holder*). 3. Notice of any thing published in a paper of intelligence. By the statute law the penalty of 50*l.* is inflicted on persons advertising a reward with "no questions to be asked" for the return of things lost or stolen. The same penalty attaches to the printer.

ADVERTISER. *s.* (*avertisseur*, Fr.) 1. He that gives intelligence or information. 2. That paper in which advertisements are published.

ADVERTISING. *a.* (from *advertise*.) Active in giving intelligence, monitory (*Shakspeare*).

To ADVESPERATE. *v. n.* (*advespero*, Lat.) To draw toward evening.

ADVICE. *s.* (*avis*, *advis*, Fr.) 1. Counsel, instruction (*Prior*). 2. Reflection, prudent consideration (*Shakspeare*). 3. Consultation, deliberation (*Bacon*). 4. Intelligence.

ADVICE BOAT. *s.* A vessel employed to bring intelligence.

Letter of Advice, in commerce, implies a letter sent by the drawer of a bill of exchange, or the remitter of goods, &c. to his correspondent, informing him that he has drawn such a bill, or sent such a quantity of merchandize, by such a ship, or other conveyance.

ADVISABLE. *a.* (from *advise*.) Prudent, fit to be advised (*South*).

ADVISABLENESS. *s.* (from *advisable*.) The quality of being advisable, fitness, propriety.

To ADVISE. *v. a.* (*aviser*, Fr.) 1. To

counsel (*Shakspeare*) 2 To inform, to make acquainted

To ADVISE *v n* 1 To consult 2 To consider, to deliberate (*Milton*)

ADVISED *particip a* (from *advise*) 1 Acting with deliberation and design, prudent, wise (*Bacon*) 2 Performed with deliberation, acted with design (*Hooker*)

ADVISEDLY *ad* (from *advised*) Deliberately, purposely, by design, prudently (*Suc*)

ADVISEDNESS (from *advised*) Deliberation, cool and prudent procedure (*Saunderson*)

ADVISEMENT *s* (*avisement*, Fr) 1 Counsel, information (*Spenser*) 2 Prudence, circumspection

ADVISER *s* (from *advise*) The person that advises, a counsellor (*Waller*)

ADULATION *s* (*adulation*, Fr *adulatio*, Lat) Flattery, high compliment (*Clarendon*)

ADULATOR *s* (*adulator*, Lat) A flatterer

ADULATORY *a* (*adulatorius*, Lat) Flattering, full of compliments

ADULT *a* (*adultus*, Lat) Grown up, past the age of infancy (*Blackmore*)

ADULT *s* A person above the age of infancy, or grown to some degree of strength (*Sharp*)

To ADULTER *a* (*adulterer* Fr) To commit adultery with another (*Jonson*)

ADULTERANT *s* (*adulterans*, Lat) The person or thing which adulterates

To ADULTERATE *v a* (*adulterer* Fr) 1 To commit adultery (*Shakspeare*) 2 To corrupt by some foreign admixture (*Boyle*)

ADULTERATE *a* (from the verb) 1 Tainted with the guilt of adultery (*Shakspeare*) 2 Corrupted with some foreign mixture (*Swift*)

ADULTERATENESS *s* (from *adulterate*) The quality or state of being adulterate

ADULTERATION (from *adulterare*, to corrupt) Is the corruption, or debasement, by an improper mixture, of any substance that was originally what pure state This art, though not unknown to the ancients has in modern times been carried to a great extent insomuch that the rules and principles upon which so pernicious a practice is founded, are often considered as qualifications essential to those persons who supply others with the necessaries, as well as the luxuries, of life We are, indeed provided with excellent laws against adulterations but opportunities are too frequently taken either of eluding the vigilance and severity of justice, or of concealing the nefarious practice in so skilful a manner, as to render detection extremely difficult, and sometimes impossible We shall present to our readers the best methods known of detecting adulteration, under those articles which relate to the various substances liable to it, as ACIDS, BEER, BREAD, COFFEE, HONEY, OIL, SPIRITS, TEA, TOBACCO, VINEGAR, WAX, WINE, &c See also L[illegible], FLOUR, &c

ADULTERATION OF COIN, is effected divers ways, as, by making use of a wrong or baser metal, or an undue alloy, &c To adulterate or debase the current coin, is a capital crime in all civilised nations

ADULTERATION (*adulteratio*) In pharmacy, the substitution of base or counterfeit medicines for such as are genuine

ADULTERER *s* (*adulter*, Lat) The person guilty of adultery (*Dryden*)

ADULTERESS *s* (from *adulterer*) A woman that commits adultery

ADULTERINE *s* (*adulterine*, Fr) A child born of an adulteress

ADULTEROUS *a* (*adulterinus*, Lat) Guilty of adultery (*Taylor*)

ADULTERY *s* (*adulterium*, Lat) The act of violating the bed of a married person (*Dryden*) In many countries this crime has been capital in others venial and attended only with slight pecuniary mulcts Some of the penalties are serious, and even cruel, others of a humorous kind Even contrary things have been enacted as punishments for adultery By some laws the criminals are forbid marrying together in case they became single, by others they are forbid to marry any besides each other, by some, they are incapacitated from ever committing the same crime again, by others they are glutted till it becomes nauseous to themselves, as in the reign of Theodosius Among the rich Greeks, adulterers were allowed to redeem themselves by a pecuniary fine the woman's father, in such cases, returned the dower he had received from her husband which some think was refunded by the adulterer Another punishment among those people was, putting out the eyes of adulterers The Athenians had an extraordinary way of punishing adulterers, called [illegible] ῥαφανιδῶσαι practised at least on the poorer sort who were not able to pay the fines This was an awkward sort of empalement performed by thrusting one of the largest radishes up the anus of the adulterer, or, in defect thereof, a fish with a large head, called mugil, mullet Alcæus is said to have died this way though it was doubted whether the punishment was reputed mortal Juvenal and Catullus speak of this custom, as received also among the Romans, though not authorized by an express law, as it was among the Greeks Among the Romans, we are told, that the wife's father was allowed to kill both parties, committing adultery, when caught in the fact, provided he did it immediately, killing both together, and as it were with one blow The same power ordinarily was not indulged to the husband except the crime were committed with some mean or infamous person; though, in other cases, if his rage carried him to put them to death, he was not punished as a murderer On many occasions, however, revenge was not carried so far but mutilating, castrating, cutting off the ears, noses, &c served the turn The punishment allotted by the lex Julia was not, as many have imagined, death, but rather banishment, or deportation, being

interdicted fire and water though Octavius appears, in several instances, to have gone beyond his own law, and to have put adulterers to death Under Macrinus, many were burnt at a stake Constantine first by law made the crime capital Under Constantius and Constant, adulterers were burnt, or sewed in sacks and thrown into the sea Under Leo and Marcian, the penalty was abated to perpetual banishment, or cutting off the nose Under Justinian, a further mitigation was granted, at least in favour of the wife, who was only to be scourged, lose her dower, and be shut up in a monastery after two years, the husband was at liberty to take her back again, if he refused, she was shaven, and made a nun for life, but it still remained death in the husband The reason alleged for this difference is that the woman is the weaker vessel Matthæus declaims against the empress Theodora who is supposed to have been the cause of this law, as well as of others procured in favour of the sex from that emperor Under Theodosius, women convicted of this crime were punished after a very singular manner, viz by a public constupration, being locked up in a narrow cell, and forced to admit to their embraces all the men that would offer themselves To this end, the gallants were to dress themselves on purpose, having several little bells fastened to their clothes, the tinkling of which gave notice to those without of every motion This custom was again abolished by the same prince To the scandal of Britain, adultery is a growing crime, notwithstanding the heavy pecuniary damages given in our courts of justice, in many cases It is reckoned a spiritual offence, that is, cognizable by the spiritual courts The common law takes no further notice of it than to allow the party grieved an action and damages By the Jewish law, adultery was punished with death in both parties where they were both married or only the woman The Jews had a particular method of trying, or rather purging an adulteress or a woman suspected of the crime, by making her drink the bitter waters of jealousy which, if she were guilty, made her swell It is much disputed whether adultery dissolves the bond of matrimony and be a sufficient cause of divorce so that the parties may marry again This was allowed in the ancient church and is still continued in the Greek as well as the Lutheran and Calvinist churches Romanists however, disallow of it and the council of Trent even anathematized those who maintain it The ecclesiastical courts in England so far agree with the Papists, that they only grant a divorce a mensa et thoro, in case of adultery, so that a complete divorce, to enable the parties to marry again, cannot be had without an act of parliament

ADULTERY is sometimes used in a more extensive sense, for any species of impurity or crime, against the virtue of chastity, and in this sense divines understand the seventh commandment

ADULTERY is also used, especially in Scripture, for idolatry, or departing from the true God, to the worship of a false one

ADULTERY is used, in ecclesiastical writers, for a person's invading, or intruding into a bishopric, during the former bishop's life The reason of the appellation is, that a bishop is supposed to contract a kind of spiritual marriage with his church The translation of a bishop from one see to another was also reputed a species of adultery, on the supposition of its being a kind of second marriage, which, in those days, was esteemed a degree of adultery This conclusion was founded on that text of St Paul, Let a bishop be the husband of one wife, by a forced construction of church for wife, and of bishop for husband

ADULTNESS s (from *adult*) The state of being adult

ADUMBRANT a (from *adumbrate*) That gives a slight resemblance

To ADUMBRATE v a (*adumbro*, Lat) To shadow out, to give a slight likeness, to exhibit a faint resemblance (*Decay of Piety*)

ADUMBRATION s (from *adumbrate*) 1 The act of giving a slight and imperfect representation (*Bacon*) 2 A faint sketch (*Hale*)

ADUNATION s (from *ad* and *unus* Lat) The state of being united, union (*Boyle*)

ADUNCITY s (*aduncitas*, Lat) Crookedness hookedness (*Arbuthnot*)

ADUNQUE a (*aduncus* Lat) Crooked, bending inward, hooked (*Bacon*)

ADVOCACY s (from *advocate*) Vindication, defence apology (*Brown*)

ADVOCARIA in the middle ages, a tax paid the lord for his protection

ADVOCATE s (*advocatus*, Lat) 1 He that pleads the cause of another in a court of judicature (*Ayl Dryd*) 2 He that pleads any cause in whatever manner, as a controvertist or vindicator (*Shakspeare*) 3 In the sacred sense, one of the offices of our Redeemer (*Milton*)

ADVOCATE, among the Romans, a person skilled in their law, who undertook the defence of causes at the bar The Roman advocates answered to one part of the office of a barrister in England, viz the pleading part, for they never gave counsel, that being the business of the jurisconsulti

ADVOCATE OF A CITY, in the German polity, an appellation given to a magistrate appointed in the emperor's name to administer justice

ADVOCATE is more particularly used in church history, for a person appointed to defend the rights and revenues of a church or religious house The word advocatus, or advowee is still retained for what we usually call the patron or he who has the advowson, or right of presentation in his own name

Consistorial Advocates, officers of the consistory at Rome who plead in all oppositions to the disposal of benefices in that court they are ten in number

Elective Advocates, those chosen by the abbot, bishop, or chapter, a particular licence

being had from the king or prince for that purpose

Feudal Advocates These were of the military kind, who were to lead the vassals of the church to war, not only in private quarrels of the church itself but in military expeditions for the kings service, in which they were the standard-bearers of their churches

Fiscal Advocate, fisci advocatus, in Roman antiquity, an officer of state under the Roman emperors, who pleaded in all causes wherein the fiscus, or private treasury was concerned

Juridical Advocates, in the middle age, those who from attending causes in the court of the count of the province, became judges themselves, and held courts of their vassals thrice a year, under the name of the tria placita generalia

Matricular Advocates, were the advocates of the mother or cathedral churches

Military Advocates were introduced in the times of confusion when every person was obliged to maintain his property by force, bishops and abbots not being permitted to bear arms, recourse was had to knights, noblemen, soldiers, or even to princes

Regular Advocates those duly formed and qualified for their profession by a proper course of study, the requisite oath, subscription, licence &c

Subordinate Advocates, those appointed by other superior ones, acting under them, and accountable to them

Supreme or *Sovereign Advocates*, were those who had the authority in chief, but acted by deputies or subordinate advocates These were called also principal, greater, and sometimes general advocates Such in many cases were kings, &c when either they had been chosen advocates, or became such by being founders or endowers of churches

Faculty of Advocates, in Scotland a respectable body of lawyers, in number above 200 who plead in all causes before the courts of session justiciary, and exchequer They are also entitled to plead in the house of peers, and other supreme courts in England

Lord Advocate or *King's Advocate* one of the eight great officers of state in Scotland who is such sit in parliament without election He is the principal crown lawyer in Scotland His business is to act as a public prosecutor and to plead in all causes that concern the crown

ADVOCATION s (from *advocate*) The office of pleading, plea, apology (*Shakspeare*)

ADVOCATION among civilians the act of calling another to assist in pleading some cause

ADVOCATION, LETTERS OF, in the law of Scotland a writ issued by the lords of session, advocating or calling, a cause from an incompetent judge to them elves

ADVOCATIONE DECIMARUM, a writ which lies for claiming, fourth part of tithes or upwards belonging to any church

ADVOLATION s (*advolo, advolatum*, Lat) The act of flying to something

ADVOLUTION s (*advolutio*, Lat) The act of rolling to something

ADVOUTRY s (*avoutrie*, Fr) Adultery (*Bacon*)

ADVOW, in ancient law books, signifies to justify or maintain an act formerly done It also signifies to call upon or produce

ADVOWEE, in ancient customs and law books, denotes the advocate of a church, religious house, or the like There were advowees of cathedrals, abbeys, monasteries, &c Thus, Charlemagne had the title of advowee of St Peters, king Hugh, of St Riquier, &c These advowees were the guardians, protectors, and administrators of the temporal concerns of the churches, and under their authority were passed all contracts which related to them It appears also, from the most ancient charters, that the donations made to churches were conferred on the persons of the advowees They always pleaded the causes of the churches in court and distributed justice for them, in the places under their jurisdiction In a statute 25 Edw III we meet with advowee paramount, for the highest patron, that is, the king

ADVOWSON, or ADVOWSEN, in common law, signifies a right to present to a vacant benefice Advowsons formerly were most of them appendant to manors and the patrons were parochial barons the lordship of the manor, and patronage of the church, were seldom in different hands, until advowsons were given to religious houses But of late times, the lordship of the manor and advowson of the church have been divided Advowsons are presentative collative or donative presentative, where the patron presents or offers his clerk to the bishop of the diocese, to be instituted in his church, collative where the benefice is given by the bishop as original patron thereof, or by means of a right he has acquired by lapse, donative, is where the king or other patron does by a single donation in writing, put the clerk into possession, without presentation, institution, or induction Colleges holding more advowsons in number than a moiety of the fellows, are not capable of purchasing more Grants of advowsons by papists are void Advowsons are temporal inheritances and lay fees, they may be granted by deed or will, and are assets in the hands of heirs or executors Presentations to advowsons for money, or other reward, are void 31 Eliz cap 6 See Burns Eccl Law vol 1 For more on this subject, see Tomlins's Jacob's Dictionary art Advowson

ADVOWTRY See ADULTERY

To ADURE v n (*aduro*, Lat) To burn up (*Bacon*)

ADUST a (*adustus*, Lat) 1 Burnt up, scorched (*Bacon*) 2 It is generally now applied to the complexion and humours of the body (*Pope*)

ADUSTED a (See ADUST) Burnt, dried with fire scorched (*Milton*)

ADUSTIBLE a (from *adust*) That may be adusted, or burnt up

ADUSTION *s* (from *adust*) The act of burning up, or drying, as by fire (*Harvey*)

ADY, in natural history, a name given to the palm-tree of the island of St Thomas

ADYNAMIA (from *α* priv and *δυναμις*, *power*) A defect of vital power constituting in Cullen, order ii of the class neuroses, and comprehending syncope, dyspepsia, and hypocondriasis

ADYTUM, in pagan antiquity, the most retired and sacred place of their temples into which none but the priests were allowed to enter The term is purely Greek, signifying inaccessible

ADZE, or ADDICE, a cutting tool, of the ax-kind, having its blade made thin, and arching, and its edge at right angles to the handle, chiefly used for taking off thin chips of timber or boards, and for paring away certain irregularities which the ax cannot come at

AE, or Æ, a diphthong compounded of A and E Authors are by no means agreed as to the use of the *ae* in English words Some, from a consideration that it is no proper diphthong in our language (its sound being no other than that of the simple *e*,) contend that it ought to be entirely disused, and, in fact, the simple *e* has of late been much adopted instead of the Roman æ as in the word equator, &c

ÆACEA, in antiquity, feasts and combats, celebrated in Ægina, in honour of their king Æacus

ÆACUS, the son of Jupiter by Ægina When the isle of Ægina was depopulated by a plague, his father, in compassion to his grief changed all the ants upon it into men and women who were called Myrmidons, from *μυρμηξ an ant* The foundation of the fable is said to be, that when the country had been depopulated by pirates, who forced the few that remained to take shelter in caves Æacus encouraged them to come out, and by commerce and industry recover what they had lost His character for justice was such, that, in a time of universal drought, he was nominated by the Delphic oracle to intercede for Greece, and his prayer was answered The pagans also imagined that Æacus, on account of his impartial justice, was chosen by Pluto one of the three judges of the dead, and that it was his province to judge the Europeans

ÆCHMALOTARCHA, in antiquity a Greek term, signifying the chief, or leader of the Jewish captives in Babylonia The Jewish name was rosch-galeth

ÆCIDIUM, a genus of the Linnéan class and order cryptogamia, fungi, with membranous cases, glabrous both sides filled with naked seeds not cohering Its species are eleven, of which some are clustered, and others solitary

ÆDES, in Roman antiquity, signified ordinarily a house, but often a chapel or inferior kind of temple not consecrated

ÆDILE, ÆDILIS, among the ancient Romans, implied a magistrate, whose chief business consisted in superintending edifices of all kinds, especially those which belonged to the public, as temples, aqueducts, bridges &c They had also the care of the highways, public places, weights, and measures The prices of provisions were also fixed by the ædiles, who also punished lewd women, and such persons as frequented gaming houses They had the custody of the plebiscita, or orders of the people, inspected all comedies, and other pieces of wit, and were obliged to exhibit magnificent games to the people at their own expence There were originally only two ædiles, who were chosen out of the common people, but these in general being unable to support the enormous expence attending their office, two others were created out of the patrician order these took upon themselves the charges of the games, and were called ædiles curules, or majores, as the two plebeians were stiled minores Julius Cæsar, in order to ease these four magistrates, increased their number to six, calling the two additional ones ædiles cereales, from their having the inspection of all manner of grain committed to their care

ÆDITUUS, in Roman antiquity, an officer belonging to the temple, who had the charge of the offerings, treasure, and sacred utensils The female deities had a woman officer of this kind called Æditua

ÆDOIA, the same as PUDENDA

ÆDON, daughter of Pandarus married Zethus brother to Amphion, by whom she had a son called Itylus She was so jealous of her sister Niobe, because she had more children than herself, that she resolved to murder the elder, who was educated with Itylus She by mistake killed her own son and was changed into a nightingale as she attempted to kill herself

ÆDORIA, (*αιδοια* from *αιδω modesty*, or from *α* neg and *ειδω to see*) The pudenda, or external sexual organs in females

ÆDOSOPHIA (*αιδοιοψοφια* from *αιδοιον* and *ψοφεω to break wind*) flatus from the womb passing through the vagina

ÆGEAN SEA (ancient geography,) now the Archipelago, a part of the Mediterranean, separating Europe from Asia and Africa, washing, on one hand Greece and Macedonia on the other Caria and Ionia The origin of the name is greatly disputed Festus advanced three opinions one, that it is so called from the many islands therein, at a distance appearing like so many goats another because Ægea queen of the Amazons perished in it a third opinion is, because Ægeus the father of Theseus threw himself headlong into it

ÆGEUS, king of Athens, son of Pandion, being desirous of having children, went to consult the oracle and in his return, stopped at the court of Pittheus, king of Troezene, who gave him his daughter Æthra in marriage He left her pregnant, and told her, if she had a son to send him to Athens as soon as he could lift a stone under which he had concealed his sword By this sword he was to be known to Ægeus, who did not wish to make any public discovery of a son, for fear of his nephews, the Pallantides, who expected his crown Æthra became

mother of Theseus, whom she accordingly sent to Athens with his father's sword. At that time Ægeus lived with Medea, the divorced wife of Jason. When Theseus came to Athens, Medea attempted to poison him, but he escaped, and upon shewing Ægeus the sword he wore, discovered himself to be his son. (Apollod. Paus. &c.) The Ægean sea is supposed to be called after him. Theseus when he returned from Crete, omitted to hoist white sails as a signal of his subduing the Minotaur, as he had agreed with Ægeus. His disconsolate father, at the sight of the black sails, threw himself into this sea. Ægeus reigned 48 years, and died B. C. 1235.

ÆGIAS, (αιγια from αιξ *a goat*,) a white concretion in the pupil of the eye, so called because goats are said to be frequently subject to it.

ÆGICERAS. In botany, a genus of the Linnean class and order pentandria, monogynia, thus distinguished. Calyx five-cleft, petals five; capsul curved, one-celled, one valved, one seeded. It has been only found in the Moluccas, which produce two species, the a. majus and a. minus.

ÆGIDION, a name given to a collyrium for inflammations and defluxions of the eye.

ÆGILOPS, or ÆGYLOPS, (αιγυλωψ from αιξ and ωψ *the eye*.) In surgery an ulcer in the internal canthus of the eye, so called, because goats are said to be peculiarly subject to it. 2. The holm-oak, because its acorns resemble a goat's eye. 3. The great wild oat grass, or drink, resembling in colour the goat's eye, constituting a genus of the Linnean class and order polygamia, monœcia thus characterized: herm. calyx, glume or husk about three flowered, cartilaginous, corol, glume ending in a triple awn, stamens three, styles two, seed one. Male stamens three. It is a native of the south of Europe, and offers four species to the eye of the naturalist.

ÆGINA, daughter of Asopus, had Æacus by Jupiter changed into a flame of fire. She afterwards married Actor, son of Myrmidon, by whom she had some children, who conspired against their father. Some say that she was changed by Jupiter into the island which bears her name.

ÆGINA, an island formerly called Œnopia, in a part of the Ægean sea, called Saronicus Sinus. The inhabitants were very powerful by sea, and gave themselves to Darius when he demanded submission from all the Greeks. The Athenians under Pericles expelled them from their possessions, the island is now called Engia. Herodot. Strab. &c.

ÆGINETIA. In botany, a genus of the Linnéan class and order didynamia, angiospermia, thus characterised: calyx one leaved, spathaceous, or sheathy, corol campanulate, two-lipped, capsule many cells. The only species known of it is a native of Malabar.

ÆGIOCUS, a surname of Jupiter, from his using the goat Amalthæa's skin, instead of a shield, in the war of the Titans.

ÆGIPHILA. In botany, a genus of the Linnéan class and order tetrandria, monogynia thus characterised, calyx four-toothed; corol four-cleft; style semibifid, berry two-celled, with two seeds in each. It is an inhabitant of both the Indies, and eight species of it have been discovered.

ÆGIRA, a town of Achaia, supposed to be founded by Ægirus, the sixth king of Sicyon, and situate between Ægium and Sicyon, opposite to Parnassus. It is now a small village called Hylocastro.

ÆGIS, in the ancient mythology, a name given to the shield or buckler of Jupiter and Pallas.—The goat Amalthea, which had suckled Jove, being dead, that god is said to have covered his buckler with the skin thereof, whence the appellation ægis, from αιξ, αιγο, *she goat*. Jupiter, afterwards restoring the beast to life again, covered it with a new skin, and placed it among the stars. As to his buckler, he made a present of it to Minerva, whence that goddess's buckler is also called ægis.—Minerva, having killed the Gorgon Medusa, nailed her head in the middle of the ægis, which henceforth had the faculty of converting into stone all those who looked thereon, as Medusa herself had done during her life.—Others take the ægis not to have been a buckler, but a cuirass or breast-plate.

ÆGISTHUS, son of Thyestes by his own daughter Philopeia, who, to conceal her shame, exposed him in the woods. Some say he was taken up by a shepherd and suckled by a goat, whence he was called Ægisthus. He corrupted Clytemnestra the wife of Agamemnon, and with her assistance slew her husband, and reigned seven years in Mycenæ. He was, together with Clytemnestra, slain by Orestes. Pompey used to call Julius Cæsar Ægisthus, on account of his having corrupted his wife Mutia, whom he afterward put away, though he had three children by her.

ÆGIUM, (ancient geography) a town of Achaia Propria, five miles from the place where Helice stood, and famous for the council of the Achæans, which usually met there, on account either of the dignity, or commodious situation of the place. It was also famous for the worship of Ομαγυριος, i. e. Conventional Jupiter, and of Panachæan Ceres. The territory of Ægium was watered by two rivers, viz. the Phœnix and Meganitas. The epithet is Ægiensis.

ÆGLE. In botany, a genus of the Linnean class and order polyandria, monogynia, thus distinguished: calyx five lobed, petals five, berry globular, many-celled, with numerous seeds in each. The only known species of this genus is a tree in the East Indies with thorny branches, and a fruit equally delicious to the taste and fragrant to the smell.

ÆGLIA, (αιγλια from αιξ) the same as Ægias.

ÆGOCEROS, in astronomy, a name given to the constellation Capricorn. Thus says Lucan.

"Varii mutator circulus anni
"Ægoceron, cancrumque tenet."

Pan, dignified by the poets, and elevated to

the stars, transformed himself into a goat, and was called Ægoceris

ÆGOPODIUM, (from ποδαγρα or, (reversed) αγρα ποδος, *the gout*) Gout-weed, or gout-wort, so named from its supposed benefit in this disease called also wild angelica, or herb gerard A genus in the Linnean class and order pentandria, trigynia, thus characterised, fruit ovate-oblong, ribbed, petals inflected, heart shaped, unequal The only known species is to be found wild in our own hedges and road sides, with small white flowers, and leaves resembling those of the angelica

ÆGOPRICORN In botany, a genus of the Linnean class and order monœcia, diandria Its male is an ament, common calyx three-cleft, partial one tubular, corolless, anther four-lobed In its female the flowers are solitary, calyx as in the male, corolless, styles three, united at the base, capsule three grained The only known species is a tree of the East Indies, with flowers issuing from the end of the branchlets

ÆGYPTIACUM An ointment consisting of honey, verdigrease and vinegar (*Quin*)

ÆINAUTÆ, in antiquity, a name given to the senators of Miletus, because they held their deliberations aboard a ship

ÆL, or EAL, or AL In compound names all, or altogether So Aldred altogether reverend Alfred altogether peaceful (*Gibson*)

ÆLF, implies assistance So Elfwin is victorious (*Gibson*)

ÆLIA CAPITOLINA, a name given by the emperor Adrian from Ælius that of his own family, and Capitolinus the epithet of Jupiter, to the new city which he caused to be built about A D 134, near the spot where the ancient Jerusalem stood, and which on his visit to the eastern parts of the Roman empire he found in ruins

ÆLIAN CLAUDIUS, a Roman sophist of Præneste, in the reign of Adrian He first taught rhetoric at Rome, but being disgusted with his profession he became author, and published treatises on animals in seventeen books, on various history in fourteen books, &c in Greek, a language which he preferred to Latin He was surnamed Μελιγλωσσος, *honey mouthed*, on account of the peculiar sweetness of his style Martial refers to this excellence lib xii epigr 24

"O jucunda, Covine, solitudo,
Carrucâ magis, essedoque gratum
Facundi mihi munus Æliani

ÆLURUS, in mythology, a deity worshipped by the ancient Ægyptians, under the form of a cat, or that of a man, with the head of that animal They had likewise a goddess, whom they represented under the figure of a woman with the head of a cat The Ægyptians had so superstitious a regard for this animal, that the killing it, whether by accident or design, was punished with death and Diodorus relates, that in the time of extreme famine they chose rather to eat one another, than touch these sacred animals

ÆMOBOLIUM, in antiquity, the blood of a bull or ram, offered in the sacrifices called taurobolia and criobolia.

ÆNARIA, an island in the bay of Cumæ, which Pliny says derived its name from its being the station of the ships of Æneas

ÆNEAS, in fabulous history, a famous Trojan prince, son of Anchises and Venus At the destruction of Troy he bore his aged father on his back, and saved him from the Greeks, but being too solicitous about his son and household gods, lost his wife Creusa getting on board a ship, he set sail, and landed in Macedonia, in Sicily, and in Africa, where he was kindly received by queen Dido, but forsaking her he landed in Italy, where he married Lavinia the daughter of king Latinus, and defeated Turnus, to whom she had been contracted After the death of his father-in-law he was made king of the Latins, over whom he reigned three years but joining with the Aborigines, he was slain in a battle against the Tuscans Virgil has rendered the name of this prince immortal, by making him the hero of his poem

ÆNEID, the name of Virgil's celebrated epic poem There is nothing in antiquity to equal the sixth book of the Æneid Yet, a late writer, M La Harpe, in his Lycée, or Lectures at the Lyceum, does not allow Virgil to be the inventor of a single incident, and scarcely of a verse in his poem He acknowledges however, that the third, fourth, and sixth books are admirable productions In the estimation of this author, the excellence of Virgil rests on the constant perfection of his style, to surpass which seems impossible It is at once, he says, the delight and despair of all who wish to cultivate poetry, so that if he has not equalled Homer in invention, variety, or constant interest, he has surpassed him in the beauty of particular parts, and in the fine taste with which he has embellished his narratives

ÆNI, in ancient geography, an island of the Red sea, situated to the east of Hippos and south of the Elanitic gulf

ÆNIGMA, a proposition put in obscure ambiguous, and generally contradictory terms, to puzzle, or exercise the wit, in finding out its meaning, or, in obscure discourse, covering some common and well-known thing, under remote and common terms The word is formed of αινιττεσθαι, *obscure innuere, to hint a thing darkly*, of αινος, *an obscure speech, discourse* The Latins sometime call it scirpus sirpus, or scrupus The populace with us name it riddle, from the Belgic raeden, or the Saxon araethan, to interpret The use of ænigmas was very great among the Egyptians Gale thinks they might borrow their custom from the Hebrews, among whom, it is certain, ænigmas were not less in use Witness Samson's riddle, Judg xiv 12, 13 I will now put forth a riddle to you, &c חידה, i e according to Vatable, an ænigmatical problem the LXX render it, προβλημα Solomon is said to have been particularly skilful in the solution of ænigmas Joseph Antiq lib v cap 2

Clemens assures us, that the Egyptians placed sphinges before their temples, to intimate that the doctrines of God and religion were ænigmatical and obscure. See HIEROGLYPHIC.

Ænigmas consist in words, which, whether they be in prose or verse, contain either some description, a question, or a prosopopœia. The last kind are the most pleasing, inasmuch as they give life and action to things which otherwise have them not. To make an ænigma, therefore, two things are to be pitched on, which bear some resemblance to each other, as the sun and a monarch, or a ship and a house; and on this resemblance is to be raised a superstructure of contrarieties to amuse and perplex. It is easier to find great subjects for ænigmas in figures than in words, inasmuch as painting attracts the eyes and excites the attention to discover the sense. The subjects of enigmas in painting, are to be taken either from history or fable; the composition here is a kind of metamorphosis, wherein, *e. g.* human figures are changed into trees, and rivers into metals. It is essential to ænigmas, that the history or fable, under which they are presented, be known to every body, otherwise it will be two ænigmas instead of one; the first of the history or fable, the second of the sense in which it is to be taken. Another essential rule of the enigmas is, that it only admit of one sense. Every ænigma which is susceptive of different interpretations, all equally natural, is so far imperfect. The alchemists are great dealers in the ænigmatic language, their processes for the philosopher's stone being generally wrapped up in riddles; *e. g.* Fac ex mare et fæmina circulum, inde quadrangulum, hinc triangulum, fac circulum, et habebis lapidem philosophorum.—F. Menestrier has attempted to reduce the composition and resolution of enigmas to a kind of art, with fixed rules and principles, which he calls the philosophy of ænigmatic images. There are some ænigmas in history, complicated to a degree which much transcends all rules, and has given great perplexity to the interpreters of them. Such is that celebrated ancient one, Ælia Lælia Crispis, about which many of the learned have puzzled their heads. There are two exemplars of it: one found 140 years ago on a marble near Bologna, the other in an ancient MS. written in Gothic letters, at Milan. It is controverted between the two cities, which is to be reputed the more authentic.

The Bononian Ænigma.

D. M.
Ælia Lælia Crispis,
Nec vir, nec mulier,
Nec androgyna,
Nec puella, nec juvenis,
Nec anus,
Nec casta, nec meretrix,
Nec pudica,
Sed omnia.
Sublata
Neque fame, neque ferro,
Neque veneno,
Sed omnibus.
Nec cælo, nec terris,
Nec aquis,
Sed ubique jacet.
Lucius Agatho Priscius,
Nec maritus, nec amator,
Nec necessarius,
Neque mærens, neque gaudens,
Neque flens,
Hanc,
Nec molem, nec pyramidem,
Nec sepulchrum,
Sed omnia,
Scit et nescit, cui posuerit.

That is to say, To the gods manes, Ælia Lælia Crispis, neither man, nor woman, nor hermaphrodite; neither girl, nor young woman, nor old; neither chaste, nor a whore, nor a modest woman, but all these: killed neither by hunger, nor steel, nor poison, but by all these: rests neither in heaven, nor on earth, nor in the waters, but every-where. Lucius Agatho Priscius, neither her husband, nor lover, nor friend, neither sorrowful, nor joyful, nor weeping, certain, or uncertain, to whom he rears this monument, neither erects her a temple, nor a pyramid, nor a tomb, but all these. In the MS. at Milan, instead of D. M. we find A. M. P. P. D. and at the end the following addition:

Hoc est sepulchrum intus cadaver non habens,
Hoc est cadaver sepulchrum extra non habens,
Sed cadaver idem est & sepulchrum sibi.

i. e. Here is a sepulchre without a corpse; here is a corpse without a sepulchre: the corpse and sepulchre are one and the same. We find near fifty several solutions of this ænigma advanced by learned men. Marius Michael Angelus maintains Ælius Lælius Crispus to signify rain-water falling into the sea. Ri. Vitus first explained it of Niobe turned to a stone; afterwards of the rational soul; and afterwards of the Platonic idea. Jo. Turrius, of the materia prima. Fr. Schottius, of an eunuch; by others it has been thought, a lawsuit, a shadow, music, hemp, friendship, chastity, pope Joan, Lot's wife, the christian church, &c. &c.

ÆNIGMATICAL, something which relates to, or partakes of, the nature of ænigmas.

ÆNIGMATOGRAPHER, or ÆNIGMATIST, a maker or explainer of ænigmas.

ÆNIGMATOGRAPHY, or ÆNIGMATOLOGY, the art of making, or of explaining, or of collecting ænigmas.

ÆNITHOLOGICUS, in poetry, a verse of two dactyls, and three trochæi, as Prælia dira placent truci juventæ.

ÆOLIC, or ÆOLIAN, in grammar, denotes one of the five dialects of the Greek tongue. It was first used in Bœotia, whence it passed into Æolia, and was that which Sappho and Alcæus wrote in. The Æolic dialect generally throws out the aspirate or sharp spirit, and agrees in so many things with the Doric dialect, that the two are usually confounded together.

ÆOLIC VERSE, carmen Æolicum, a kind of measure, consisting first of an iambic, or

spondee, then of two anapests, divided by a syllable, and lastly, a syllable common

ÆOLIPILE, in hydraulics, a hollow ball of metal, with a very small hole or opening, chiefly used to shew the convertibility of water into elastic steam The best way of fitting up this instrument, is with a very slender neck or pipe, to screw on and off, for the convenience of introducing the water into the inside, for by unscrewing the pipe, and immerging the ball in water, it readily fills, the hole being pretty large, and then the pipe is screwed on But if the pipe do not screw off, its orifice is too small to force its way in against the included air, and therefore to expel most of the air, the ball is heated red hot, and suddenly plunged with its orifice into water, which will then rush in till the ball is about two-thirds filled with the water The water having been introduced, the ball is set upon the fire, which gradually heats the contained water, and converts it into elastic steam, which rushes out by the pipe with great violence and noise and thus continues till all the water is so discharged, though not with a constant and uniform blast, but by fits and the stronger the fire is, the more elastic will the steam be and the force of the blast Care should be taken that the ball be not set upon a violent fire with very little water in it, and that the small pipe be not stopped with any thing, for in such case, the included elastic steam will suddenly burst the ball with a very dangerous explosion This instrument, Des Cartes, and others, have made use of to account for the natural cause, and generation, of wind —And hence its name, Æolipila, q d pila Æoli Æolus's ball or Αιολυπυλαι, *the gates of Æolus* Dr Plott gives an instance where the Æolipile is actually used to blow the fire the lord of the manor of Essington is bound by his tenure to drive a goose every New-year's day, three times round the hall of the lord of Hilton, while Jack of Hilton (a brazen figure having the structure of an Æolipile) blows the fire

ÆOLIS, or ÆOLIA, in ancient geography, a country of Asia minor, situate between Troas to the north and Ionia to the south According to Strabo it extended from the promontory Lectus to the river Hermus, and contained eleven cities The Æolians according to Josephus were descended from Elishah, one of the sons of Javan, while the Greek historians say they descended from Æolus

ÆOLUS, in mechanics a small machine, the invention of Mr Tidd, calculated for changing the air in rooms when too hot or unfit for respiration It supplies the place of a square in the window, and works with very little noise, like the sails of a common window ventilator

ÆOLUS, in mythology, the god of the winds, was the son of Hippotas, by Menecla, the daughter of Hyllus, king of Lipara He dwelt in the island Stronggyle, one of the seven islands that are called Æolian, as being under the dominion of Æolus Others say, that his residence was in the island Lipara and others at Rhegium, in Italy But all agree in giving him an absolute authority over the winds, which they say he confined in a vast cavern, and let loose whenever he pleased The name seems to be derived from αιολο *various*, because the winds over which he presided are ever varying

ÆOLUS'S HARP, a very pleasing musical instrument, invented by Kircher The construction is perfectly simple, consisting of little more than a number of catgut or wire strings, distended in parallel lines over a box of wood with a thin top containing soundholes When the strings are tuned unison and the instrument is placed in a proper situation to receive a current of air, it produces by the tremulous motion given by the wind to the strings, a soft, murmuring and pleasing combination of sounds, which is beautifully described by Thomson in his Castle of Indolence

"A certain music never known before
Here lull'd the pensive melancholy mind,
Full easily obtain'd Behoves no more,
But sidelong, to the gently waving wind
To lay the well-tun'd instrument reclin'd,
From which, with airy-flying fingers light,
Beyond each mortal touch the most refin'd,
The god of winds drew sounds of deep delight,
Whence, with just cause, the harp of Æolus, it hight

Several attempts to explain the principles of the wild harmony of this instrument have been made by different authors, but we have seen none so satisfactory as that of Dr M Young, which is subjoined The particles of a current of air, which strike against the middle point of a stretched elastic string, will move the whole string from its rectilinear position and as no blast continues of the same strength for any considerable time, although it be able to remove the string from its rectilineal position yet, unless it be too rapid and violent, it will not be able to keep it bent, the fibre will therefore, by its elasticity, return to its former position and by its acquired velocity pass it on the other side, and so continue to vibrate and excite pulses in the air, which will produce the tone of the entire string But, if the current of air be too strong and rapid when the string is bent from the rectilineal position, it will not be able to recover it, but will continue bent and bellying like the cordage of a ship in a brisk gale However though the whole string cannot perform its vibrations, the subordinate aliquot parts may, which will be of different lengths in different cases according to the rapidity of the blast Thus when the velocity of the current of air increases so as to prevent the vibration of the whole string, these particles which strike against the middle points of the halves of the string agitate those halves and as these halves vibrate in half the time of the whole string though the blast may be too rapid to admit of the vibration of the whole, yet it can have no more effect in preventing the motion of the halves, than it would have on the whole string, were its tension quadruple, for

the times of vibrations in strings of different lengths, agreeing in other circumstances, are directly as the lengths, and in strings differing in tension, and agreeing in other circumstances, inversely as the square roots of the tensions, (see CHORD) and therefore, their vibrations may become strong enough to excite such pulses as will affect the drum of the ear and the like may be said of other aliquot divisions of the string Those particles which strike against such points of the string as are not in the middle or aliquot parts, will interrupt and counteract each other's vibrations, as is the case of sympathetic and secondary tones, and therefore will not produce a sensible effect When Æolian notes are heard which are not produced by any submultiple of the string (see HARMONICS,) they are very transitory, and immediately vary their pitch, till they coincide with the notes next above or below them, which are produced by exact aliquot parts of the whole string and thus the harmony is never interrupted by long continued discords

ÆON, (αιων, *age*,) literally signifies the duration of a thing

ÆON, (αιων, *time*, *life*, *duration*) the life or spirit of man the spinal marrow, or function of life

ÆON, among the followers of Plato, was used to signify any virtue, attribute, or perfection hence they represented the deity as an assemblage of all possible æons, and called him πληρωμα, a Greek term signifying *fullness* The Valentinians, who, in the first ages of the church, blended the conceits of the Jewish cabalists, the Platonists, and the Chaldean philosophers, with the simplicity of the Christian doctrine, invented a kind of Theogony, or Genealogy of Gods (not unlike that of Hesiod,) whom they called by several glorious names, and all by the general appellation of Æons among which they reckoned Ζωη *Life*, Λογος, *Word*, Μονογενης, *Only-begotten*, Πληρωμα, *Fullness*, and many other divine powers and emanations amounting in number to thirty which they fancied to be successively derived from one another, and all from one self-originated deity, named Bythus, i e profound or unfathomable, whom they called likewise, The most high and ineffable Father See VALENTINIANS

ÆORA, among ancient physicians, a peculiar kind of exercise, which consisted in being carried about in a litter or other vehicle Sometimes the patient's bed was hung by ropes, in the manner of a hammock, and moved backwards and forwards Travelling in a chariot, or on board a ship or boat, were also accounted so many kinds of æora

ÆQUALIS POLYGAMIA, (Equal Polygamy) The name of the first order in the class Syngenesia of Linnéus's system, containing those compound flowers, which have all the florets hermaphrodite and alike See BOTANY

ÆQUE, (from *æquus*, equal,) equally the same as ana.

ÆQUISONANT a musical term, properly applicable to unisons but which is frequently given to octaves, because they so affect the ear as almost to seem one and the same sound

AER, (αηρ, from אור *aor*, *light*, ether, Hebr) The transparent, elastic fluid that surrounds the globe

AER FIXUS See CARBONIC ACID

ÆRA, in chronology, is the same as epoch, or epocha, and means a fixed point of time, from which to begin a computation of the years ensuing The word is sometimes also written era in ancient authors Its origin is contested, though it is probably from the Arabic for time appointed Some imagine that it is formed from a er a the abbreviations of the words annus erat Augusti, or from a e r a the initials of the words annus erat regni Augusti, because the Spaniards began their computation from the time that their country came under the dominion of Augustus For an account of the principal æras see EPOCH

ÆRA also means the way or mode of accounting time Thus we say such a year of the Christian æra, &c

ÆRARIUM, the treasury or place where the public money was deposited amongst the Romans Ærarium differs from fiscus, as the first contained the public money, the second that of the prince the names are, however, sometimes used indiscriminately There are several treasuries mentioned in history, as Ærarium Sanctius, Privatum, Vicesimarum, Ilithyæ, Veneris, &c

ÆRARIUS, a name variously applied by the Romans 1 To a degraded citizen 2 To an officer who distributed money to the soldiery, or people 3 To one employed in coining or working brass 4 To a soldier who received pay

AERATA AQUA See ZIMENT WATER

AERATED IRON a name given by Bergman to what is commonly called rust of iron, but which modern chemists denote by carbonate of iron, being formed by the union of that substance with the water and carbonic acid supplied by the atmosphere See CARBONATE OF IRON

AERATED MURIATIC ACID, called by Scheele dephlogisticated muriatic acid, is a combination of that acid with the base of vital air, or the oxygenous principle, and is now termed oxygenated muriatic acid, which see

AERATED MINERAL ALKALI See CARBONATE OF SODA

AERATED VEGETABLE ALKALI See CARBONATE OF POTASH

AERATED WATER, so called by Bergman, is water impregnated with carbonic acid by shaking these two fluids together, so as to bring them as much as possible into contact with one another It is somewhat heavier than distilled water, agitation makes it sparkle, it has a pungent acidulous taste, and reddens the tincture of turnsol Heat decomposes it, soon brings it to a state of ebullition, and disengages the elastic fluid The contact of air produces the same effect, and, therefore, to preserve this acidulous liquor, it must be enclosed in vessels properly stopped, and standing in a cool

place, or strongly compressed. This acid solution abounds throughout nature: acidulous and gaseous waters, such as those of Pyrmont, Seltz, &c. consist of it. In consequence of its great use in all putrid disorders, either by drinking or bathing, methods and machines have been invented to impregnate with ease and expedition any quantity of water with as much of the carbonic acid as it can maintain in solution. Dr. Priestley was the first who gave an account of the process, but it has since been much improved by Dr. Nooth, Mr. Parker, and Magellan. See Dr. Priestley's Experiments on Air, vol. v. p. 83 and 112. (See MINERAL WATERS in this Dictionary.) The term aerated water is sometimes applied, and perhaps with more propriety, to water containing atmospheric air, to distinguish it from boiled water which has been deprived of its air by heat.

AERIAL ACID, the same as CARBONIC ACID, which see.

AERIAL PERSPECTIVE, is that which represents bodies diminished and weakened in proportion to their distance from the eye. Aerial perspective chiefly respects the colours of objects, whose force and lustre it diminishes more or less, to make them appear as if more or less remote. It is founded upon this, that the longer the column of air an object is seen through, the more feebly do the visual rays emitted from it affect the eye.

AERIANS, in church history, a branch of Arians, who to the doctrines of that sect added some peculiar dogmas of their own, as, that there is no difference between bishops and priests, a doctrine maintained by many modern divines, particularly of the presbyterian and reformed churches. The sect received its denomination from Aerius an Armenian priest of the fourth century.

AERIEL. *a.* (*aërius*, Lat.) 1. Belonging to the air, as consisting of it (*Arb.*). 2. Produced by the air (*Dryden*). 3. Inhabiting the air (*Milton*). 4. Placed in the air (*Pope*). 5. High, elevated in situation (*Philips*).

AERIFORM FLUIDS. See GAS.

AERITIS (αηριτις, from αηρ, *the air*.) The jasper-stone, from its sky-blue tinge; also, for the same reason, the herb blue pimpernel.

AEROGRAPHY, (from αηρ, *air*, and γραφω, *I describe*.) a description of the air or atmosphere, its limits, properties, &c. amounting to much the same as Aerology, unless the latter be confined to the theory, and the former to the description.

AEROLITHS (from αηρ, *the air*, and λιθος, *a stone*.) air-stones: a name lately given to those solid bodies composed of several mineral substances, which have been seen to fall from the atmosphere. The descent of any such bodies was for a long time doubted, the popular opinion that asserted their reality being regarded as a vulgar prejudice, but the fact has been often proved of late in such a manner as to leave no reasonable doubt of the existence of the phenomenon. The following table drawn up by M. Izarn, a philosopher who has paid considerable attention to the history of aerolites, exhibits a collection of the best authenticated instances of the falling of stones, &c. from the atmosphere hitherto observed, together with the time when they fell, and the persons on whose evidence the fact rests.

Substances	*Places where they fell*	*Period of their Fall*	*Testimony*
Shower of stones	At Rome	Under Tullus Hostilius	Livy
Shower of stones	At Rome	Consuls C. Martius & M. Torquatus	J. Obsequens
Shower of iron	In Lucania	Year before the defeat of Crassus	Pliny
Shower of mercury	In Italy		Dion
A very large stone	Near the river Negos, Thrace	Second year of the 78th Olympiad	Pliny
Three large stones	In Thrace	Year before J. C. 452	Ch. of Count Marcellin
Shower of fire	At Quesnoy	January 4th, 1717	Geoffroy le Cadet
Stone of 72lbs	Near Larissa, Macedonia	January 1706	Paul Lucas
About 1200 stones — 120 lbs Another of 60 lbs	Near Padua, in Italy	In 1510	Carden Varcit
Another of 59 lb	On Mount Vaiser, Provence	November 27th, 1627	Gassendi
Shower of sand for 1[illegible] hours	In the Atlantic	April 6th, 171[illegible]	Père la Feuillee
Shower of sulphur	Sodom and Gomorrah	Year before J. C. 1898	Moses
Sulphureous rain	In the duchy of Mansfeld	In 1658	Spangenberg
The same	Copenhagen	In 1646	Olaus Wormius
Shower of sulphur	Brunswick	October 1721	Siegesber
Ditto of a viscid unknown matter	Ireland	In 1695	Muschenbroeck
Two large stones weighing 20 lbs	Liponas in Bresse	September 1753	Delalande
A stony mass	Niort, Normandy	In 1750	Delalande
A stone of 7½ lbs	At Luce, in Le Maine	September 13th, 1768	Bachelay
A stone	At Aire, in Artois	In 1768	Gurson de Boyaval
A stone	In Le Cotentin	In 1768	Morand
Extensive shower of stones	Environs of Agen	July 24th, 1790	St. Amand, Baudin, &c
About 12 stones	Sienna, Tuscany	July 1794	Earl of Bristol
A large stone of 56 lbs	Wold Cottage, Yorkshire	December 13th, 1795	Captain Topham
A stone of about 20 lbs	Salé, department of the Rhone	March 17th, 1798	Lelievre and De Drée
A stone of 10 lbs	In Portugal	February 19th, 1796	Southey
Shower of stones	Benares, East Indies	December 19th, 1798	J. Lloyd Williams, Esq
Shower of stones	At Plann, near Tabor, Bohemia	July 3d, 1753	B. de Born
Mass of iron, 70 cubic feet	America	April 5th, 1800	Philosophical Magazine
Mass of ditto, 14 quintals	Abakank, Siberia	Very old	Pallas, Chladni, &c
Shower of stones	Barboutan, near Roquefort	July 1789	Darcet, jun. Lomet, &c
Large stone, 260 lbs	Ensisheim, Upper Rhine	November 7th, 1492	Butenschoen
Two stones, 200 and 300 lbs	Near Verona	In 1762	Acad. de Bourd
A stone of 20 lbs	Sales, near Ville Franche	March 12th, 1798	De Drée
Several ditto, from 10 to 17 lbs	Near L'Aigle, Normandy	April 26th, 1803	Fourcroy

The larger sort of these stones have been seen as luminous bodies to move with very great velocities, descending in oblique directions, commonly with a loud hissing noise, resembling that of a mortar shell, or cannon ball, or rather, that of an irregular hard mass, projected violently through the air, surrounded by a blaze or flame, tapering off to a narrow stream in the hinder part of it, are heard to explode or burst, and seen to fly in pieces, the

larger parts going foremost, and the smaller following in succession they are thus seen to fall on the earth, and strike it with great violence, and on examining the place of the fall, the parts are found scattered about, being still considerably warm, and most of them entered the earth several inches deep But their most remarkable character, and that which distinguished them first is that they have a perfect resemblance to one another They are always different from the neighbouring bodies, and present in every case the same appearance of semimetallic matter, coated on the outside with a thin black encrustation, and bearing strong marks of recent fusion But besides this, several of these singular substances have been most carefully examined by Fourcroy, Howard, Count de Bournon, Lavoisier, Vauquelin, and others among the most able chemists and naturalists in Europe, and it has been found that all the substances examined agree very nearly in nature and composition, having the same component materials and in nearly the same proportions thus the stones examined by Count de Bournon and Mr Howard were found to consist of four distinct substances, viz small metallic substances, a peculiar martial pyrites a number of globular and elliptical bodies, also of a peculiar nature, and an earthy cement surrounding the other component parts The nature of the metallic particles was the same in all, being in each an alloy of iron and nickel In the pyrites, nickel as well as iron was detected and the easy decomposition of the pyrites by muriatic acid, afforded a distinguishing character of this substance The globules contained magnesia, silica, and oxides of nickel and iron The earthy cement consisted of the same substances nearly in the same proportions With regard to the actual proportion of these constituents, the celebrated stone which fell at Ensisheim, in Alsace, in 1492, yielded by the analysis of Fourcroy and Vauquelin,

56 0	of silica
30 0	oxyd of iron
12 0	magnesia
2 4	nickel
3 5	sulphur
1 4	lime
105 3	

The stones which fell at Laigle, in France, in 1803, yielded to the same philosophers,

54	of silica
36	oxyd of iron
9	magnesia
3	oxyd of nickel
2	sulphur
1	lime
105	

It likewise appears that the specific gravities of these bodies are such as greatly to exceed all the known ordinary stones, and approach that of metallic ores Thus, the specific gravity of the Ensisheim stone was 3233, of the Benares one, 3352, Sienna, 3352, Gassendi's, 3456; Yorkshire, 3508, Bachelay's, 3535, the specific gravity of water being assumed 1000 These common and constant characters indicate with strong evidence a common origin Yet it is necessary to remark that iron is scarcely ever found in the metallic state in terrestrial bodies volcanic bodies only containing them in the state of oxyd Nickel is also very rare, being never found on the surface of the earth Whence it is not unnatural to conclude that aeroliths have an origin foreign to our globe, or at least that they are not produced from phenomena which have been commonly observed Various hypotheses, therefore, have been devised to account for the origin of these stones Among others, it has been conceived that they might be projected upon the earth from lunar volcanoes On subjecting this idea to calculus it has been found that a projectile force quadruple of that usually given to a 12 pounder ball, would be sufficient to carry a body out of the sphere of the moon's influence, so that the terrestrial gravitation would draw it towards our planet Now, it is not at all improbable that lunar volcanoes might impress such a force upon a body, since terrestrial volcanoes can communicate a much greater impulsion This opinion acquires a fresh degree of probability from the recent observations of Schroeter upon the moon, with respect to the great height of some of the lunar volcanoes, and the frequent variations upon the surface of that globe and it has been ably defended in a curious dissertation by Dr Hutton, in the new abridgement of the Philosophical Transactions, part xxi Other philosophers think that aeroliths are nothing else than little planets that circulate in space after the manner of the other celestial bodies, and which, when found engaged in the atmosphere of the earth, become inflamed there, by the friction and resistance they experience, lose little by little their velocity, and at length fall to the earth by reason of their heaviness Mr King, sir William Hamilton and others, consider these stones as concretions actually formed in the atmosphere But for our own parts, we are at present most inclined to embrace the opinion which ascribes the origin of aeroliths to lunar volcanoes though, in the present state of our knowledge of these substances and of meteorology, it is not possible to decide Should any thing be discovered while this work is publishing, that shall tend to throw any better light upon their origin, we mean to resume the subject under the article METEORIC STONES The inquisitive reader may in the mean while consult Mr Howard's valuable paper in the Philosophical Transactions, for 1802, and the dissertation by Dr Hutton, as above mentioned

AEROLOGIA, (from ἀηρ, and λογος *a discourse, or disquisition*) That part of medical study which treats of air, explains its properties and use in the animal economy, and its efficacy in maintaining or restoring health

AEROMANCY, AEROMANTIA, an ancient species of divination, performed by the

means of the air, and phænomena happening therein The word is compounded of ἀηρ, *air*, μαντεια, *divination*

AEROMETRY, a scientific term, which has now given way to the equivalent term pneumatics

AERONAUT, a person who mounts in an air balloon, and manages it while in the air

AERONAUTICA, from ἀηρ and ναυτικος, derived from ναυς *ship*, the art of sailing in a vessel or machine through the atmosphere, sustained as a ship in the sea See AEROSTATION

AEROPHOBI (from ἀηρ, and φοβος *terror*) A term employed by Cœlius Aurelianus to indicate hysteric or phrenitic persons who are fearful of being abroad either in a dark or a lucid atmosphere

AEROPHOBIA, (ἀηροφοβια) the disease to which the aerophobi or aerophobous are subject

AE[illegible] ([illegible] ἀηρ and σκοπεω, Gr) The [illegible]

AEROSTATIC [illegible] balloon, is a name given to a [illegible] situated between the feet of Capricorn This constellation was proposed by M Lalande, in 1798, when he had an interview with M Borda, Dr Zach, and other German astronomers, at Gotha, whither he was sent to convert them to the French calendar and measures he did not obtain the object of his mission

AEROSTATION, (formed of ἀηρ, *air*, and στατικη, of ιστημι, *I weigh* the science of weights,) in its primary and proper sense, denotes the science of weights, suspended in the air, but in the modern application of the term, it signifies the art of navigating through the air, both in the principles and the practice of it Hence also the machines, which are employed for this purpose, are called aerostats, or aerostatic machines, and, on account of their round figure, air-balloons The aeronaut, formed of ἀηρ and ναυτης, *sailor*, is the person who navigates through the air by means of such machines

Principles of Aerostation The fundamental principles of this art have been long and generally known, as well as the speculations on the theory of it, but the successful application of them to practice seems to be altogether a modern discovery These principles chiefly respect the weight or pressure, and elasticity of the air, with its specific gravity, and that of the other bodies to be raised or floated in it the particular detail of which principles may be seen under the respective words in this dictionary Suffice it therefore in this place to observe, that any body which is specifically, or bulk for bulk, lighter than the atmosphere, or air encompassing the earth, will be buoyed up by it, and ascend, like as wood, or a cork, or a blown bladder, ascends in water And thus the body would continue to ascend to the top of the atmosphere, if the air were every where of the same density as at the surface of the earth But as the air is compressible and elastic, its density decreases continually in ascending, on account of the diminished pressure of the superincumbent air, at the higher elevations above the earth, and therefore the body will ascend only to such height where the air is of the same specific gravity with itself, where the body will float, and move along with the wind or current of air, which it may meet with at that height This body then is an aerostatic machine, of whatever form or nature it may be And an air-balloon is a body of this kind, the whole mass of which, including its covering and contents, and the weights annexed to it, is of less weight than the same bulk of air in which it rises We know of no solid bodies however that are light enough thus to ascend and float in the atmosphere, and therefore recourse must be had to some fluid or aeriform substance Among these, that which is called inflammable air, the hydrogen gas of the new nomenclature, is the most proper of any that have hitherto been discovered It is very elastic, and from six to ten or eleven times lighter than common atmospheric air at the surface of the earth, according to the different methods of preparing it If therefore a sufficient quantity of this kind of air be inclosed in any thin bag or covering the weight of the two together will be less than the weight of the same bulk of common air, and consequently this compound mass will rise in the atmosphere, and continue to ascend till it attain a height at which the atmosphere is of the same specific gravity as itself, where it will remain or float with the current of air, as long as the inflammable air does not escape through the pores of its covering And this is an inflammable air-balloon Another way is to make use of common air, rendered lighter by warming it, instead of the inflammable air Heat, it is well known, rarefies and expands common air, and consequently lessens its specific gravity, and the diminution of its weight is proportional to the heat applied If therefore the air inclosed in any kind of a bag or covering, be heated, and consequently dilated, to such a degree, that the excess of the weight of an equal bulk of common air, above the weight of the heated air, be greater than the weight of the covering and its appendages, the whole compound mass will ascend in the atmosphere, till, by the diminished density of the surrounding air, the whole become of the same specific gravity with the air in which it floats, where it will remain, till, by the cooling and condensation of the included air, it shall gradually contract and descend again, unless the heat is renewed or kept up And such is a heated air-balloon, otherwise called a Montgolfier, from its inventor Now it has been discovered, by various experiments, that one degree of heat, according to the scale of Fahrenheit's thermometer, expands the air about one five-hundredth part and therefore that it will require about 500 degrees, or nearer 484 degrees of heat, to expand the air to just double its bulk, which is a degree of heat far above what it is practicable to give it on such occasions And

therefore in this respect, common air heated is much inferior to inflammable air, in point of levity and usefulness for aerostatic machines. Upon such principles then depends the construction of the two sorts of air-balloons. But before treating of this branch more particularly, it will be proper to give a short historical account of this late discovered art.

History of Aerostation. Various schemes for rising in the air, and passing through it, have been conceived and attempted, both by the ancients and moderns, and that upon different principles and with various success. Of these some attempts have been upon mechanical principles, or by virtue of the powers of mechanism; and such are conceived to be the instances related of the flying pigeon made by Archytas, the flying eagle and fly by Regiomontanus, and various others. Again, other projects have been formed for attaching wings to some part of the body, which were to be moved either by the hands or feet, by the help of mechanical powers, so that striking the air with them, after the manner of the wings of a bird, the person might raise himself in the air, and transport himself through it, in imitation of that animal. The romances of almost every nation have recorded instances of persons being carried through the air, both by the agency of spirits and mechanical inventions; but till the time of the celebrated lord Bacon, no rational principle appears ever to have been thought of by which this might be accomplished. Friar Bacon indeed had written upon the subject; and many had supposed, that, by means of artificial wings, a man might fly as well as a bird; but these opinions were refuted by Borelli in his treatise De Motu Animalium, where, from a comparison between the power of the muscles which move the wings of a bird, and those which move the arms of a man, he demonstrates that the latter are utterly insufficient to strike the air with such force as to raise him from the ground. In the year 1672, bishop Wilkins published his "Discovery of the New World," in which he certainly seems to have conceived the idea of raising bodies into the atmosphere by filling them with rarefied air. This however he did not by any means pursue, but rested his hopes upon mechanical motions to be accomplished by human strength, or by springs, &c. which have been proved incapable of answering any useful purpose. The jesuit Francis Lana, contemporary with bishop Wilkins, proposed to exhaust hollow balls of metal of their air, and by that means occasion them to ascend. But though the theory was unexceptionable, the means were certainly insufficient to the end; for a vessel of copper, made sufficiently thin to float in the atmosphere, would be utterly unable to resist the external pressure: which being demonstrated, no attempt was made upon that principle. So that we may reckon nothing to have been particularly concerted towards aerostation, till the experiment of one Gusman a Portuguese friar, who is reported early in the last century to have launched a paper bag into the air; which, however, soon fell, after attaining the height of 200 feet. Soon after Mr Cavendish's discovery of the specific gravity of inflammable air, it occurred to the ingenious Dr Black of Edinburgh, that if a bladder, sufficiently light and thin, were filled with this air, it would form a mass lighter than the same bulk of atmospheric air, and rise in it. This thought was suggested in his lectures in 1767 or 1768; and he proposed, by means of the allantois of a calf, to try the experiment. Other employments, however, prevented the execution of his design. The possibility of constructing a vessel, which, when filled with inflammable air, would ascend in the atmosphere, had occurred also to Mr Cavallo about the same time; and to him belongs the honour of having first made experiments on this subject, in the beginning of the year 1782, of which an account was read to the Royal Society, on the twentieth of June in that year. He tried bladders, but the thinnest of these, however scraped and cleaned, were too heavy. In using China paper, he found that the inflammable air passed through its pores, like water through a sieve; and having failed of success by blowing this air into a thick solution of gum, thick varnishes, and oil paint, he was under a necessity of being satisfied with soap-balls, which, being inflated with inflammable air, by dipping the end of a small glass tube, connected with a bladder containing the air, into a thick solution of soap, and gently compressing the bladder, ascended rapidly in the atmosphere; and these were the first sort of inflammable air-balloons that were ever made.

But while aerostation seemed thus on the point of being made known in Britain, it was all at once announced in France, by two brothers, Stephen and John Montgolfier, natives of Annonay, and masters of a considerable paper-manufactory there, who had turned their thoughts to this project as early as the middle of the year 1782. Their idea was to form an artificial cloud, by inclosing smoke in a bag, and making it carry up the covering along with it. In that year, the experiment was made at Avignon with a fine silk bag; and by applying burning paper to an aperture at the bottom, the air was rarefied, and the bag ascended to the height of 70 feet.—Various experiments were now tried upon a large scale, which excited the public curiosity very greatly. An immense bag of linen, lined with paper, and containing upwards of 23,000 cubic feet, was found to have a power of lifting about 500 pounds including its own weight. Burning chopped straw and wool under the aperture of the machine, immediately occasioned it to swell, and afterwards to ascend into the atmosphere. In ten minutes it had risen 6000 feet; and when its force was exhausted, it fell to the ground at the distance of 7668 feet from the place it had left. Soon after this, one of the brothers, invited by the Academy of Sciences to repeat his experiments at their expence, constructed a large balloon of an elliptical form. In a preliminary experiment, this machine

lifted from the ground eight persons who held it, and would have carried them all off if more had not quickly come to their assistance Next day the machine was filled by the combustion of fifty pounds of straw, and twelve pounds of wool The machine soon swelled, and sustained itself in the air, together with the charge of between 4 and 500 pounds weight It was designed to repeat the experiment before the king at Versailles, but a violent storm of rain and wind happening to damage the machine, it became necessary to prepare a new one and such expedition was used that this vast balloon near 60 feet in height and 43 in diameter was made, painted within and without, and finely decorated, in no more than four days and four nights Along with it was sent a wicker cage containing a sheep, a cock, and a duck, which were the first animals ever sent on such a voyage The full success of the experiment was however prevented by a violent gust of wind, which tore the machine in two places near the top before it ascended Still it rose 1440 feet and after remaining in the air about eight minutes, fell to the ground at the distance of 10,200 feet from the place of its setting out The animals were not in the least hurt

As the great power of these aerostatic machines, and their very gradual descent, shewed they were capable of transporting people through the air with all imaginable safety, M Pilatre de Rozier offered himself to be the first aerial adventurer in a new machine, constructed in a garden in the fauxbourg of St Antoine It was of an oval shape 48 feet in diameter and 74 in height curiously painted with the signs of the zodiac, ciphers of the king's name, and other ornaments A proper gallery, grate &c enabled the person who ascended to supply the fire with fuel, and thus keep up the machine as long as he pleased The weight of the whole apparatus was upwards of 1000 pounds On the 15th of October 1783 M Pilatre placing himself in the gallery, the machine was inflated and permitted to ascend to the height of 84 feet, where he kept it afloat about four minutes and a half after which it descended very gently and such was its tendency to ascend, that it rebounded to a considerable height after touching the ground On repeating the experiment, he ascended to the height of 210 feet His next ascent was 262 feet, and in the descent, a gust of wind having blown the machine over some large trees in an adjoining garden, M Pilatre suddenly extricated himself by throwing straw and wool on the fire which raised him at once to a sufficient height On descending again, he once more raised himself to a proper height by the same means Some time after, he ascended with M Girond de Villette to the height of 330 feet hovering over Paris at least nine minutes in sight of all the inhabitants, and the machine keeping all the while a steady position These experiments shewed, that aerostatic machines might be raised or lowered at the pleasure of the persons who ascended On the 21st of November, 1783, therefore, M Pilatre and the marquis d'Arlandes undertook an aerial voyage, which lasted about 25 minutes, and during which time they passed over a space of above five miles From the account given by the marquis, they met with several different currents of air, the effect of which was to give a very sensible shock to the machine, and the directions of the motion seemed to be from the upper part downwards It appears also that they were in some danger of having the balloon burnt altogether, as the marquis observed several round holes made by the fire in the lower part of it, which alarmed him considerably and indeed not without reason However, the progress of the fire was easily stopped by the application of a wet sponge, and all appearance of danger ceased

This voyage of M Pilatre and the marquis may be said to conclude the history of aerostatic machines which are elevated by means of fire, these having been soon after superseded by balloons in which inflammable air was enclosed This gas, being considerably lighter than heated atmospheric air, possessed many advantages over the other The first experiment was made by two brothers, Messrs Robert and M Charles, a professor of experimental philosophy The bag was composed of lutestring varnished over with a solution of the elastic gum, called caoutchouc, and was about 13 English feet in diameter Many difficulties occurred in filling it with the inflammable air, but being at last set at liberty, after having been well filled, it was 35 pounds lighter than an equal bulk of common air It remained in the atmosphere only three quarters of an hour, during which it traversed 15 miles Its sudden descent was supposed to have been owing to a rupture which had taken place when it ascended into the higher regions of the atmosphere The event of this experiment and the aerial voyage made by Messrs Rosier and Arlandes naturally suggested the idea of undertaking something of the same kind with a balloon filled with inflammable air The machine used on this occasion was formed of gores of silk covered with a varnish of caoutchouc, of a spherical figure, and measuring 27½ feet in diameter A net was spread over the upper hemisphere, and fastened to a hoop, which passed round the middle of the balloon To this a sort of car was suspended a few feet below the lower part of the balloon, and in order to prevent the bursting of the machine, a valve was placed in it, by opening of which some of the inflammable air might be occasionally let out The car was of basket work covered with linen, and beautifully ornamented, being 8 feet long 4 broad and 3½ deep its weight 130 pounds Great difficulties again occurred in filling the machine but these at last being removed, the two adventurers took their seats at three quarters after one in the afternoon of the first of December, 1783 At the time the balloon rose, the thermometer stood at of Fahrenheit, and the barometer at 30 18 inches, and, by means of the power of ascent with which they left the ground, the balloon rose till the mercury fell to 27 inches, from

which they calculated their height to be about 600 yards. Throwing out ballast occasionally as they found the machine descending by the escape of some of the inflammable air, they found it practicable to keep at pretty near the same distance from the earth during the rest of their voyage, the quicksilver fluctuating between 27 and 27.65 inches, and the thermometer between 53° and 57°, the whole time. They continued in the air an hour and three quarters, and alighted at the distance of 27 miles from Paris, having suffered no inconvenience during their voyage, nor experienced any contrary currents of air, as had been felt by Messrs Pilatre and Arlandes. As the balloon still retained a great quantity of inflammable gas, M. Charles determined to take another voyage by himself. M. Robert accordingly got out of the machine, which now being 130 pounds lighter, arose with such velocity, that in twenty minutes he was almost 9000 feet in the air, and entirely out of sight of terrestrial objects. The globe, which had been rather flaccid, soon began to swell, and the inflammable air escaped in great quantity. He also drew the valve, to prevent the balloon from bursting, and the inflammable gas, being considerably warmer than the external air, diffused itself all round, and was felt like a warm atmosphere. In ten minutes, however, the thermometer indicated a great variation of temperature; his fingers were benumbed with cold, and he felt a violent pain in his right ear and jaw, which he ascribed to the expansion of the air in these organs as well as to the external cold. The beauty of the prospect which he now enjoyed, however, made amends for these inconveniencies. At his departure the sun was set on the valleys, but the height to which M. Charles was got in the atmosphere rendered him again visible, though only for a short time. He saw, for a few seconds, vapours rising from the valleys and rivers. The clouds seemed to ascend from the earth, and collect one upon the other, still preserving their usual form, only their colour was grey and monotonous for want of sufficient light in the atmosphere. By the light of the moon, he perceived that the machine was turning round with him in the air, and he observed that there were contrary currents which brought him back again. He observed also, with surprise, the effects of the wind, and that the streamers of his banners pointed upwards, which, he says, could not be the effect either of his ascent or descent, as he was moving horizontally at the time. At last, recollecting his promise of returning to his friends in half an hour, he pulled the valve, and accelerated his descent. When within 200 feet of the earth, he threw out two or three pounds of ballast, which rendered the balloon again stationary, but, in a little time afterwards, he gently alighted in a field about three miles distant from the place whence he set out, though, by making allowance for all the turnings and windings of the voyage, he supposes that he had gone through nine miles at least. By the calculations made, it appears that he rose at this time not less than 10,500 feet; a height somewhat greater than that of Mount Ætna.

The subsequent aerial voyages differ so little from that just now related, that any particular description of them seems to be superfluous. It had occurred to M. Charles, however, in his last flight, that there might be a possibility of directing the machine in the atmosphere, and this was afterwards attempted by M. Jean-Pierre Blanchard. In one of the aerostatic excursions of the latter, he gives an account of the sensations he felt during his voyage, and which were somewhat different from those of M. Charles, having in one part of it found the atmosphere very warm, in another cold, and having once found himself very hungry, and at another time almost overcome by a propensity to sleep. The height to which he arose, as measured by mathematical instruments, was thought to be very little less than 10,000 feet, and he remained in the atmosphere an hour and a quarter. Notwithstanding the rapid progress of aerostation in France, it is remarkable that we have no authentic account of any experiments of this kind being attempted in other countries. Even in our own island, where all arts and sciences find an indulgent nursery, and many their birth, no aerostatic machine was seen before the month of November 1783. Various speculations have been made on the reasons of this strange neglect of so novel and brilliant an experiment, but none seemed to carry any shew of probability, except that it was said to be discouraged by the leader of a philosophical society,* expressly instituted for the improvement of natural knowledge, for the reason, as was said, that it was the discovery of a neighbouring nation. Be this however as it may, it is a fact that the first aerostatic experiment was exhibited in England, by a foreigner unconnected and unsupported. This was a count Zambeccari, an ingenious Italian, who happened to be in London about that time. He made a balloon of oiled silk, 10 feet in diameter, weighing only 11 pounds; it was gilt, both for ornament and to render it more impermeable to the inflammable air with which it was to be filled. The balloon, after being publicly shewn for several days in London, was carried to the Artillery-ground, and there being filled about three-quarters with inflammable air, and having a direction inclosed in a tin box for any person by whom it should afterwards be found, it was launched about one o'clock on the 25th of November, 1783. At half past three it was taken up near Petworth in Sussex, 48 miles distant from London, so that it travelled at the rate of near 20 miles an hour. Its descent was occasioned by a rent in the silk, which must have been the effect of the rarefaction of the inflammable air when the balloon ascended to a rarer part of the atmosphere. The attempts of M. Blanchard to direct his machine through the atmosphere, were repeated in 1784, by Messrs Morveau and Bertrand, at Dijon, who raised themselves with an inflammable air-balloon to the height, as it was

thought, of 13,000 feet passing through a space of 18 miles in an hour and 25 minutes M Morveau had prepared oars for directing the machine through the air, but they were damaged by the wind, so that only two remained serviceable, by working these, however, they were able to produce a sensible effect on the motion of the machine In a third aerial voyage performed by M Blanchard, he seemed to produce some effect by the agitation of his wings, both in ascending, descending, moving sideways, and even in some measure against the wind however this is supposed, with some probability, to have been a mistake, as, in all his succeeding voyages, the effects of his machinery could not be perceived

Having said thus much with regard to the conducting aerostatic machines through the atmosphere, we shall now relate the attempts made to lessen their expence, by falling upon some contrivance to ascend without throwing out ballast, and to descend without losing any of the inflammable air The first attempt of this kind was made by the duke de Chartres, who, on the 15th of July 1784, ascended with the two brothers, Charles and Robert, from the park of St Cloud The balloon was of an oblong form, made to ascend with its longest diameter horizontally, and measured 55 feet in length and 24 in breadth It contained within it a smaller balloon filled with common air, by blowing into which with a pair of bellows, and thus throwing in a considerable quantity of common air, it was supposed that the machine would become sufficiently heavy to descend, especially as, by the inflation of the internal bag, the inflammable air in the external one would be condensed into a smaller space, and thus become specifically heavier The voyage, however, was attended with such circumstances as rendered it impossible to know what would have been the event of the scheme The power of ascent with which they set out seems to have been very great, as in three minutes after parting from the ground, they were lost in the clouds, and involved in such a dense vapour that they could see neither the sky nor the earth In this situation they seemed to be attacked by a whirlwind which, besides turning the balloon three times round from right to left, shocked and beat it so about, that they were rendered incapable of using any of the means proposed for directing their course, and the silk stuff of which the helm had been composed was even torn away No scene can be conceived more terrible than that in which they were now involved An immense ocean of shapeless clouds rolled one upon another below them, and seemed to prevent any return to the earth, which still continued invisible, while the agitation of the balloon became greater every moment In this extremity they cut the cords which held the interior balloon, and of consequence it fell down upon the aperture of the tube that came from the large balloon into the boat, and stopped it up They were then driven upwards by a gust of wind from below, which carried them to the top of that stormy vapour in which they had been involved They now saw the sun without a cloud, but the heat of his rays, with the diminished density of the atmosphere, had such an effect on the inflammable air, that the balloon seemed every moment ready to burst To prevent this they introduced a stick through the tube, in order to push away the inner balloon from its aperture, but the expansion of the inflammable air pushed it so close, that all attempts of this kind proved ineffectual It was now, however, become absolutely necessary to give vent to a very considerably quantity of the inflammable air, for which purpose the duke de Chartres himself bored two holes in the balloon, which tore open for the length of seven or eight feet On this they descended with great rapidity, and would have fallen into a lake, had they not hastily thrown out 60 pounds of ballast, which enabled them just to reach the water's edge This scheme for raising or lowering aerostatic machines by bags filled with common air being thus rendered dubious, another method was thought of This was to put a small aerostatic machine with rarefied air under an inflammable air balloon, but at such a distance that the inflammable air of the latter might be perfectly out of the reach of the fire used for inflating the former, and thus, by increasing or diminishing the fire in the small machine, the absolute weight of the whole would be considerably diminished or augmented This scheme was unhappily put in execution by the celebrated M Pilatre de Rozier and M Romaine Their inflammable air-balloon was about 37 feet in diameter, and the power of the rarefied air one was equivalent to about 60 pounds They ascended without any accident, but had not been long in the atmosphere when the inflammable air balloon was seen to swell very considerably, at the same time that the aeronauts were observed by means of telescopes, very anxious to get down and busied in pulling the valve and opening the appendages to the balloon, in order to facilitate the escape of as much inflammable air as possible Shortly after this the machine took fire, at the height of about three quarters of a mile from the ground No explosion was heard, and the silk of the balloon seemed to resist the atmosphere for about a minute, after which it collapsed, and descended along with the two unfortunate travellers so rapidly, that both of them were killed Pilatre seemed to have been dead before he came to the ground, but M Romaine was alive when some persons came up to him, though he expired immediately after

The first aerial voyage in England was performed on the 15th of September 1784, by Vincent Lunardi, a native of Italy His balloon was made of oiled silk, painted in alternate stripes of blue and red Its diameter was thirty three feet From a net which went over about two-thirds of the balloon descended forty-five cords to a hoop hanging below the balloon, and to which the gallery was attached The balloon had no valve, and its neck, which

terminated in the form of a pear, was the aperture through which the inflammable air was introduced, and through which it might be let out. The air for filling the balloon was produced from zinc by means of diluted vitriolic acid. Mr Lunardi departed from the Artillery-ground at two o'clock, and with him were a dog, a cat, and a pigeon. After throwing out some sand to clear the houses, he ascended to a great height. The direction of his motion at first was NW by W, but as the balloon rose higher, it fell into another current of air which carried it nearly N. About half after three he descended very near the ground and landed the cat, which was almost dead with cold; then rising, he prosecuted his voyage. He ascribes his descent to the action of an oar, but as he was under a necessity of throwing out ballast in order to re-ascend, his descent was more probably occasioned by the loss of inflammable air. At ten minutes past four he descended on a meadow near Ware in Hertfordshire. The only philosophical instrument which he carried with him was a thermometer, which in the course of his voyage stood as low as 29°, and he observed that the drops of water collected round the balloon were frozen.

The second aerial voyage in England was performed by Mr Blanchard and Mr Sheldon, professor of anatomy to the Royal Academy, being the first Englishman who ascended with an aerostatic machine. They ascended at Chelsea the 16th of October at 0 minutes past 12 o'clock. Mr Blanchard having landed Mr Sheldon at about 14 miles from Chelsea, re-ascended alone, and finally landed near Rumsey in Hampshire, about 75 miles distant from London, having gone nearly at the rate of 20 miles an hour. The wings used on this occasion it seems produced no deviation from the direction of the wind. Mr Blanchard said that he ascended so high as to feel a great difficulty of breathing; and that a pigeon, which flew away from the boat, laboured for some time to sustain itself with its wings in the rarefied air, but after wandering a good while, returned, and rested on the side of the boat.

On the 4th of October Mr Sadler, an ingenious tradesman at Oxford, ascended at that place with an inflammable air balloon of his own construction and filling. And again on the 12th of the same month he ascended at Oxford and floated to the distance of 14 miles in 17 minutes, which is at the rate of near 50 miles an hour. On the 23d of March count Zambeccari, and admiral sir Edward Vernon ascended at London, and sailed to Horsham in Sussex, at the distance of 35 miles in less than an hour. The voyage proved very dangerous, owing to some of the machinery, about the valve being damaged, which obliged them to cut open some part of the balloon when they were about two miles perpendicular height above the earth, the barometer having [illegible] ascending they passed through a dense cloud, which felt very cold, and covered them with snow. The observations they made were, that the balloon kept perpetually turning round its vertical axis, sometimes so rapidly as to make each revolution in four or five seconds, that a peculiar noise, like rustling, was heard among the clouds, and that the balloon was greatly agitated in the descent. Perhaps the most daring attempt was that of Mr Blanchard and Dr Jeffries across the straits of Dover. This took place on the 7th of January 1785, being a clear frosty morning, with a wind, barely perceptible, at NNW. The operation of filling the balloon began at ten o'clock, and at three quarters after twelve every thing was ready for their departure. At one o'clock Mr Blanchard desired the boat to be pushed off, which now stood only two feet distant from that precipice so finely described by Shakespeare in his tragedy of King Lear. As the balloon was scarcely sufficient to carry two, they were obliged to throw out all their ballast except three bags of ten pounds each, when they at last rose gently, though making very little way on account of there being so little wind. At a quarter after one o'clock, the barometer, which on the cliff stood at 29.7 inches, was now fallen to 27.3, and the weather proved fine and warm. They had now a most beautiful prospect of the south coast of England, and were able to count 37 villages upon it. After passing over several vessels they found that the balloon, at 50 minutes after one, was descending; on which they threw out a sack and a half of ballast, but as they saw that it still descended, and that with much greater velocity than before, they now threw out all the ballast. This still proving ineffectual, they next threw out a parcel of books they carried along with them, which made the balloon ascend when they were about midway betwixt France and England. At a quarter past two, finding themselves again descending, they threw away the remainder of their books, and, ten minutes after, they had a most enchanting prospect of the French coast. Still, however, the machine descended, and as they had now no more ballast, they were fain to throw away their provisions for eating, the wings of their boat, and every other moveable they could easily spare. "We threw away," say Dr Jeffries, "our only bottle, which in its descent cast out a steam like smoke, with a rushing noise, and when it struck the water, we heard and felt the shock very perceptibly on our car and balloon." All this proving insufficient to stop the descent of the balloon, they next threw out their anchors and cords, and at last stripped off their clothes, fastening themselves to certain slings, and intending to cut away the boat as their last resource. They had now the satisfaction, however, to find that they were rising, and as they passed over the high lands between Cape Blanc and Calais, the machine rose very fast, and carried them to a greater height than they had been at any former part of their voyage. They descended safely among some trees in the forest of Guiennes, where there was just opening enough to admit them.

In September 1785, Mr Baldwin ascended

from Chester, in Mr Lunardi's balloon, and after traversing in a variety of directions, he first alighted in the neighbourhood of Frodsham, then re-ascending and pursuing his excursion, he finally landed at Rixtonmoss, twenty-five miles from Chester. Mr Baldwin, who published his observations made during the voyage, and taken from minutes, mentions the following curious particulars. The sensation of ascending he compares to a strong pressure from the bottom of the car upwards against the soles of his feet. At the distance of what appeared to him seven miles from the earth, though by the barometer scarcely a mile and an half, he had a grand and most enchanting view of the city of Chester and its adjacent places below him. The river Dee appeared of a red colour, the city very diminutive, and the town entirely blue. The whole appeared a perfect plane, the highest building having no apparent height, but reduced all to the same level, and the whole terrestrial prospect appeared like a coloured map. The perspective appearance of things to him was very remarkable. The lowest bed of vapour that first appeared as cloud was pure white in detached fleeces, increasing as they rose: they presently coalesced and formed, as he expresses it, a sea of cotton, tufting here and there by the action of the air in the undisturbed part of the clouds. The whole became an extended white floor of cloud, the upper surface being smooth and even. Above this white floor he observed at great and unequal distances, a vast assemblage of thunder clouds, each parcel consisting of whole acres in the densest form: he compares their form and appearance to the smoke of pieces of ordnance which had consolidated as it were into masses of snow, and penetrated through the upper surface, or white floor of common clouds, there remaining visible and at rest. He endeavours to convey some idea of the scene by a sketch, for which see pl. 1. Aerostation fig. 2. It represents a circular view he had from the car of the balloon, himself being over the centre of the view, looking down on the white floor of clouds, and seeing the city of Chester through an opening, which discovered the landscape below limited by surrounding vapour to less than two miles in diameter. The breadth of the outer margin defines his apparent height in the balloon (viz four miles) above the white floor of clouds. The regions in which he was did not feel colder, but rather warmer, than below, and the sun felt hottest when the balloon was stationary. The discharge of a cannon when the balloon was at a considerable height, was distinctly heard, and another discharge when he was at the height of thirty yards, so disturbed him as to oblige him for safety to lay hold firmly of the cords of the balloon.

Omitting the relation of Mr Crosbie's attempt to cross the Irish channel, and of major Mooney's narrow escape from drowning in the German ocean, we proceed to remark that, about the latter end of August 1785, the longest aerial voyage we have yet heard of was performed by Mr Blanchard: he ascended at Lisle, accompanied by the chevalier de L'Epinard, and travelled 300 miles in the balloon before it descended. On this occasion, as on some former ones, Mr Blanchard made trial of a parachute, an instrument like a large umbrella invented to break the fall, in case of an accident happening to the balloon: with this machine he dropped a dog from the car soon after his ascension, which descended gently and unhurt. The most celebrated aeronaut of the present day is citizen Garnerin, a man of an ardent and ingenious mind, but probably not very intimately acquainted with the sciences connected with aerostation. We do not remember hearing of this gentleman until August 1798, on the 28th of which month he made his eleventh ascension from Paris, accompanied by a female citizen Henry. His course for a considerable time was near the ground, during which he conversed with the people below. These conversations shewed how much the earth reflected sound, for all his words were repeated five or six times. He thought at first that it might be governed by some local circumstances, which indeed is very probable with regard to the repetition. He descended several times to the same level, at distances of ten leagues asunder, where he constantly observed the same effect. This great vibration of the air was not sensible to distances exceeding 150 or 200 toises. It decreased with the distance. Having made a number of aerial voyages, M. Garnerin's mechanical acquaintance with the requisites for insuring success was confirmed by frequent experience. This gentleman, availing himself of the short interval of peace, visited England in the summer of 1802, and thus excited the attention of the British public to the almost forgotten subject of aerostation. His voyages made in this country are fresh in the memory of every one, and as they were minutely detailed in several daily papers and monthly publications, we shall be the more readily excused giving a full account of them here. On June 29th, this aeronaut accompanied by a military gentleman (captain Sowden) rose from Ranelagh, and alighted near Colchester, in less than three quarters of an hour, having in that short period travelled full 60 miles! During this voyage the aeronauts did not appear to move with any unpleasant rapidity, until they began to descend, when they were much affected by the boisterousness of the wind: their descent was attended with danger, and occupied some minutes. From this voyage, then, it may fairly be concluded that the wind often moves with much greater velocity than is commonly assigned to it: on the day this voyage was made, the wind was not thought to be more high and boisterous than it often is, yet it can hardly be doubted that its velocity was more than 80 miles per hour, and this is nearly double the velocity which is commonly assigned to such winds. See WIND.

The singular experiment of ascending into the

atmosphere with an inflammable-air balloon, and of descending with a machine called a parachute, was performed by M Garnerin on the 21st of September 1802 He ascended from St George's Parade, North Audley-street, and descended safe into a field near the small-pox hospital at Pancras The balloon was of the usual sort, viz of oiled silk, with a net, from which ropes proceeded, which terminated in, or were joined to, a single rope at a few feet below the balloon To this rope the parachute was fastened in the following manner The reader may easily form to himself an idea of this parachute, by imagining a large umbrella of canvas of about thirty feet in diameter, but destitute of the ribs and handle Several ropes of about thirty feet in length, which proceeded from the edge of the parachute, terminated in a common joining, from which shorter ropes proceeded, to the extremities of which a circular basket was fastened, and in this basket M Garnerin placed himself Now the single rope, which has been said above to proceed from the balloon, passed through a hole in the centre of the parachute, also through certain tin tubes, which were placed one after the other in the place of the handle or stick of an umbrella, and was lastly fastened to the basket, so that when the balloon was in the air, by cutting the end of this rope next to the basket, the parachute, with the basket, would be separated from the balloon, and, in falling downwards, would be naturally opened by the resistance of the air The use of the tin tubes was to let the rope slip off with greater certainty, and to prevent its being entangled with any of the other ropes, as also to keep the parachute at a distance from the basket The balloon began to be filled at about two o clock There were thirty six casks filled with iron filings and diluted sulphuric acid, for the production of the hydrogen gas These communicated with three other casks or general receivers, to each of which was fixed a tube that emptied itself into the main tube attached to the balloon At six, the balloon being quite full of gas, and the parachute, &c being attached to it, M Garnerin placed himself in the basket, and ascended majestically amidst the acclamations of innumerable spectators The weather was the clearest and pleasantest imaginable, the wind was gentle and about west by south, in consequence of which M Garnerin went in the direction of about east by north In about eight minutes time, the balloon and parachute had ascended to an immense height, and M Garnerin, in the basket, could scarcely be perceived While every spectator was contemplating the grand sight before them, M Garnerin cut the rope, and in an instant he was separated from the balloon, trusting his safety to the parachute At first, viz before the parachute opened, he fell with great velocity, but as soon as the parachute was expanded, which took place a few moments after, the descent became very gentle and gradual In the descent a remarkable circumstance was observed, namely, that the parachute with the appendage of cords and basket, soon began to vibrate like the pendulum of a clock, and the vibrations were so great, that more than once the parachute, and the basket with M Garnerin, seemed to be on the same level, or quite horizontal, which appeared extremely dangerous however, the extent of the vibrations diminished as he came pretty near the ground On coming to the earth, M Garnerin experienced some pretty strong shocks, and when he came out of the basket, he was much discomposed, but he soon recovered his spirits, and remained without any material hurt

AEROSTATION, PRACTICE OF The shape of the balloon is one of the first objects of consideration in the construction of this machine As a sphere admits the greatest capacity under the least surface, the spherical figure or that which approaches nearest to it, has been generally preferred However, since bodies of this form oppose a great surface to the air, and consequently a greater obstruction to the action of the oar or wings than those of some other form, it has been proposed to construct balloons of a conical or oblong figure, and to make them proceed with their narrow end forward Some have suggested the shape of a fish, others, that of a bird but either the globular, or the egg-like shape, is, all things considered, certainly the best which can be adopted The bag or cover of an inflammable-air balloon is best made of the silk stuff called lustring, varnished over But for a Montgolfier, or heated-air balloon, on account of its great size, linen cloth has been used, lined within or without with paper, and varnished Small balloons are made either of varnished paper, or simply of paper unvarnished, or of gold-beater's skin, or such-like light substances The best way to make up the whole coating of the balloon, is by different pieces or slips joined lengthways from end to end, like the pieces composing the surface of a geographical globe, and contained between one meridian and another, or like the slices into which a melon is usually cut, and supposed to be spread flat out Now the edges of such pieces cannot be exactly described by a pair of compasses, not being circular, but flatter or less round than circular arches, but if the slips are sufficiently narrow, or numerous, they will differ the less from circles, and may be described as such But more accurately, the breadths of the slip, at the several distances from the point, to the middle, where it is broadest, are directly as the sines of those distances, radius being the half length of the slip After providing the necessary quantity of the stuff, and each piece having been properly prepared with the drying oil, let the corresponding edges be sewed together in such a manner as to leave about half or three quarters of an inch of one piece beyond the edge of the other, in order that this may, in a subsequent row of stitches, be turned over the latter, and both again sewed down together By so doing, a considerable degree of strength is

given to the whole bag at the seams, and the hazard of the gas escaping doubly prevented Having gone in this manner through all the seams, the following method of Mr Blanchard is admirably calculated to render them yet more perfectly air-tight The seam being doubly stitched as above, lay beneath it a piece of brown paper, and also another piece over it on the outside, upon this latter pass several times a common fire-iron heated just sufficiently to soften the drying oil in the seam this done, every interstice will be now closed, and the seam rendered completely air-tight The neck of the balloon being left a foot in diameter and three in length, and all the seams finished, the bag will be ready to receive the varnish, a single coating of which on the outside is found preferable to the former method of giving an internal as well as external coat

The compositions for varnishing balloons have been variously modified, but, upon the whole, the most approved appears to be the bird-lime varnish of M Faujas St Fond, prepared after Mr Cavallo's method as follows "In order to render linseed oil drying, boil it, with two ounces of sugar of lead and three ounces of litharge for every pint of oil, till they are dissolved, which may be in half an hour Then put a pound of bird lime and half a pint of the drying oil into an iron or copper vessel whose capacity should equal about a gallon, and let it boil very gently over a slow charcoal fire till the bird-lime ceases to crackle, which will be in about half or three quarters of an hour then pour upon it two pints and a half more of the drying oil and let it boil about an hour longer, stirring it frequently with an iron or wooden spatula As the varnish whilst boiling, and especially when nearly done, swells very much, care should be taken to remove in those cases the pot from the fire, and replace it when the varnish subsides otherwise it will boil over. Whilst the stuff is boiling the operator should occasionally examine whether it has boiled enough which may be known by observing whether, when rubbed between two knives and then separated from one another, the varnish forms threads between them, as it must then be removed from the fire when nearly cool, add about an equal quantity of spirit of turpentine in using the varnish, the stuff must be stretched and the varnish lukewarm in twenty-four hours it will be dry" As the elastic resin, known by the name of Indian rubber, has been much extolled for a varnish, the following method of making it, as practised by Mr Blanchard, may not prove unacceptable Dissolve elastic resin, cut small, in five times its weight of rectified essential oil of turpentine, (ethereal spirit of turpentine of the shops), by keeping them some days together, then boil one ounce of this solution in eight ounces of drying linseed oil for a few minutes, strain the solution, and use it warm —The car or boat is best made of wicker-work, covered with leather, and painted, and the proper method of suspending it, is by ropes proceeding from the net which goes over the balloon This net should be formed to the shape of the balloon, and fall down to the middle of it, with various cords proceeding from it to the circumference of a circle about two feet below the balloon, and from that circle other ropes should go to the edge of the boat This circle may be made of wood, or of several pieces of slender cane bound together The meshes of the net may be small at top, against which part of the balloon the inflammable air exerts the greatest force, and increase in size as they recede from the top

With regard to the rarefied-air machines, Mr Cavallo recommends first to soak the cloth in a solution of sal ammoniac and common size, using one pound of each to every gallon of water, and when the cloth is quite dry, to paint it over in the inside with some earthy colour, and strong size or glue When this paint has dried perfectly, it will then be proper to varnish it with oily varnish, which might dry before it could penetrate quite through the cloth Simple drying linseed oil will answer the purpose as well as any, provided it be not very fluid If a parachute is required it should be constructed so as when distended to form but a small segment of a sphere, and not a complete hemisphere, as the weight of this machine is otherwise considerably increased, without gaining much in the opposing surface The parachute of M Garnerin is particularly defective in a too great extension of its diameter, an unnecessary addition to its weight of a lining of paper both withinside and without, the too near approximation of the basket to the body of the parachute, and especially in the want of a perpendicular cord passing from the car to the centre of the concave of the umbrella, by the absence of which the velocity of the descent is certain to be very rapid before the machine becomes at all distended, whereas, if a cord were thus disposed, the centre of the parachute would be the portion first drawn downwards by the appended weight, and the machine would be almost immediately at its full extension Having found, by experiment, the diameter required for insuring safety, the further the basket or car is from the umbrella the less fear shall we have of an inversion of the whole from violent oscillations, yet the longer the space between the car and the head of the machine the longer will be the space run through in each vibration when once begun, yet by so much the more will they be steadier and this ought to be attended to, as when by the violence of the oscillations the car became (in Garnerin's experiment) on a line with the horizontal axis of the machine (or, in other words, the point of suspension), the force of gravity, or the gravitating power of the weight in the car, on the umbrella, being at that crisis reduced to nothing, the slightest cause might have carried the body of the machine in a lateral direction, reversing the concavity of the umbrella, and M Garnerin, perhaps, have fallen upon the now convex yet internal portion of the bag, and the whole have descended

confusedly together.—It now remains to give some account of the method by which aerostatic machines may be filled; and here we are able to determine with much greater precision concerning the inflammable-air balloons than the other kind. With regard to these, a primary consideration is, the most effectual and cheap method of procuring the inflammable air. It will be found that the most advantageous methods are, by applying acids to certain metals; by exposing animal, vegetable, and some mineral substances, in a close vessel to a strong fire; or lastly, by transmitting the vapour of certain fluids through red hot tubes. For obtaining inflammable air from pit coal, asphaltum, amber, &c. &c. Mr Cavallo recommends the following apparatus: let a vessel be made of clay, or rather of iron, in the shape of a Florence flask, somewhat larger, and whose neck is longer and larger ABC, (fig. 5.) Put the substance to be used into this vessel, so as to fill about four-fifths or less of its cavity AB. If the substance be of such a nature as to swell much by the action of the fire, lute a tube of brass, or first a brass and then a leaden tube, to the neck C of the vessel, and let the end D of the tube be shaped as in the figure, so that going into the water HI, it may terminate under a sort of inverted vessel EF, to the upper aperture of which the balloon G is adapted. Things thus prepared, if the part AB of the vessel is put into the fire, and made red hot, the inflammable air produced will come out of the tube CD, and passing through the water will at last enter into the balloon G. Previous to the operation, as a considerable quantity of common air remains in the inverted vessel EF, which it is more proper to expel, the vessel EF should have a stop cock K, through which the common air may be sucked out, and the water ascend as high as the stop cock. To procure inflammable air by means of steam, Dr Priestley uses a tube of red-hot brass, upon which the steam of water has no effect; and which he fills with the turnings of iron that are separated in the boring of cannon. By this means he obtains an inflammable air, the specific gravity of which is to that of common air as 1 to 13. In this method, not yet indeed reduced to general practice, a tube about three quarters of an inch in diameter, and about three feet long, is filled with iron turnings; then the neck of a retort, or close boiler, is luted to one of its ends, and the worm of a refrigeratory is adapted to its other extremity. The middle part of the tube is then surrounded with burning coals, so as to keep about one foot in length of it red hot; and a fire is always made under the retort or boiler sufficient to make the water boil with vehemence. In this process a considerable quantity of inflammable air comes out of the refrigeratory. It is said that iron yields one half more air by this means than by the action of vitriolic acid.—With regard to the rarefied-air balloons, the method of filling them is by means of a scaffold, the breadth of which is at least two-thirds of the diameter of the machine, and elevated about six or eight feet above the ground. From the middle of it descends a well, rising about two or three feet above it, and reaching to the ground, furnished with a door, through which the fire in the well is supplied with fuel. The well should be constructed of brick, and its diameter somewhat less than that of the machine. On each side of the scaffold are erected two masts, each of which is fixed by ropes, and has a pulley at the top. The machine is to be placed on the scaffold, with its neck round the aperture of the well. The rope passing over the pulleys of the two masts, serves to lift the balloon about fifteen feet above the scaffold; and it is kept steady, and held down, whilst filling, by ropes passing through loops or holes about its equator; and these ropes may easily be disengaged from the machine, by slipping them through the loops when it is able to sustain itself. The proper combustibles to be lighted in the well are those which burn quick and clear rather than such as produce much smoke, because it is hot air, and not smoke, that is required. Small wood and straw are very fit for this purpose. As the current of hot air ascends, the machine will dilate, and lift itself above the scaffold and gallery which was covered by it. The passengers, fuel, instruments, &c. are then placed in the gallery. When the machine makes efforts to ascend, its aperture must be brought, by means of the ropes annexed to it, towards the side of the well a little above the scaffold; the fire place is then suspended in it, the fire lighted in the grate, and the lateral ropes being slipped off, the machine is let go. It has been determined by accurate experiments, that only one-third of the common air can be expelled from these large machines, and therefore the ascending power of the rarefied air in them can be estimated as only equal to half an ounce averdupoise for every cubic foot.

The conduct of balloons when constructed, filled, and actually ascending in the atmosphere, is an object of great in the practice of aerostation. The method generally used for elevating or lowering the balloons with rarefied air has been the increase or diminution of the fire, and this is entirely at the command of the aeronaut, as long as he has any fuel in the gallery. The inflammable-air balloons have been generally raised or lowered by diminishing their ballast, or by letting out some of the gas through the valve; but the alternate escape of the air in descending, and discharge of the ballast for ascending, will by degrees render the machine incapable of floating, for in the air it is impossible to supply the loss of ballast, and very difficult to supply that of inflammable air. These balloons will also rise or fall by means of the rarefaction or condensation of the inclosed air, occasioned by heat and cold, as has been already observed. Wings or oars are the only means of this sort that have been used with any probable success; and, as Mr Cavallo observes, they seem to be capable of considerable improvement, though much is not to

be expected from them, when the machine goes at a great rate It is a matter of surprise, that the various hints for directing balloons appear to lie dormant with their projectors, who seem indisposed to make any attempts to carry their plans into execution thus the inventions of professor Danzel (Philosophical Magazine, vol iv), also of Martin, and the proposals for performing the same by means of eagles trained for the purpose, or by a reversed parachute to retard the direct progress of the balloon, whereby less power will be necessary to impel it in a lateral direction, all these plans remain obsolete and unpractised from the time of their suggestion With respect to the probability of directing aerostatic machines, we may infer it to be possible, although the methods hitherto tried have been inadequate, perhaps because they were not sufficiently powerful as to expect to make so large a body as a balloon to vary from the wind by the impulsion of an oar of six or eight feet in length and one or two in breadth (and that by only endeavouring to draw the car out of the perpendicular), is to expect, by means of a boat's oar, to impel a ship of burthen Oars are doubtless the most likely mean to effect this purpose, if they were of dimensions proportionate to the effects they are wished to produce The addition of sails, where any variation from the wind is desired will prove injurious till we have attained a method (perhaps only to be accomplished by oars) of keeping the same point of the balloon continually in a given direction Yet we doubt not but these also might prove of great service in quick dispatches by water, as for instance, where it is required to pass a fortress or fleet for the succour of a besieged town, or convey dispatches thereto a small balloon of ten or twelve feet diameter provided with sails to expose a large surface to the wind being attached by a long rope to a boat, would outstrip the quickest vessel, and might also be made to deviate from the course of the wind as the water would form a counter-resisting medium, the want of which in air balloons occasions the difficulty of steering them A sail balloon similar to the above might also be advantageously attached to a land-carriage, namely, by increasing the capacity of the balloon so that its power of ascension being nearly equal to the weight of the appended carriage the latter would be drawn along by the impulsion of the wind against the balloon and sails, while the friction over the ground, by the small overplus weight, may be reasonably expected to afford a resistance sufficient to guide the machine, and allow of a deviation in the carriage of at least eight points from the course of the wind Indeed the uses of the art of aerostation, even in its present incomplete state, may be very considerable Air balloons may serve the purpose of escaping from ships that cannot safely land, from besieged places, and from other circumstances of danger They also expedite the communication of important events by signals, and serve for exploring from a great elevation adjacent coasts or regions, fleets and armies Thus, the French ascribe to the elevation of a balloon, and the information obtained in consequence of thus reconnoitring the army of the enemy, the signal victory gained in the battle of Fleurus in 1794 Balloons may likewise serve to explore and ascertain the nature of the air in the higher regions of the atmosphere One of the finest experiments made on this point is that of Gay-Lussac, who, being elevated in a balloon to the height of 6900 metres (nearly eight miles), the greatest ever attained by any person, brought some atmospheric air from those regions which, on being analysed, was found to furnish the principles of oxygen, azote, hydrogen, and carbonic acid gas, in the same proportions as at the surface of the earth Balloons would also enable us to determine the changes in the direction of winds at different altitudes, and the law of the diminution of heat at different elevations In fact, the application of these machines to the advancement of our knowledge of the various phænomena in meteorology, stands prominent, as the, perhaps only means of maturing our acquaintance with causes yet known only by their effects Their use will also be indicated in many urgent cases where other means of conveyance might fall short At the same time we conclude with remarking, that the hitherto unsuccessful attempts to render aerial navigation of service to mankind, ought to furnish no argument for causing it to be discouraged by men of sense, or prohibited by civil authority Many arts and sciences from which commercial nations now derive so much benefit were long in rearing to maturity, and were only at length produced for the public good, in consequence of patient investigation and reiterated experiments Much useful information on the theory and practice of aerostation may be obtained from Baldwin's Aeropaidia, Cavallo on Aerostation, and Description des Experiences Aerostatiques par M Faujas St Fond See also Phil Mag nos 50, 56, 57, &c

AERVA in botany, a genus of the monadelphia decandria class and order, and which, according to La Marck, bears affinity to the amaranthus

ÆRUCA (*ærugo*) Verdigrise

ÆRU'GINOUS (*æruginosus*) Green, verdigrise colour

ÆRUGO (from ἀηρ, *air* or *ether*, because of its blueish colour, or because rust is contracted by the air) The rust of any metal, and particularly of copper Verdigrise

ÆRU'GO-ÆRIS (from *ærugo*, and *æs*, copper) Rust of copper Verdigris

ÆRU'GO PRÆPARATA Prepared verdigris It is much esteemed as an escharotic, and is, on this account, the basis of the unguentum æruginis, pharm Lond In the new chemical nomenclature, prepared verdigris is termed oxydum cupri viride per acidum acetosum

ÆRUSCATORES, in antiquity, a kind of sharping strollers, who got their living by

tricks, telling fortunes, and the like, much like modern gypsies Also, oppressive tax-gatherers.

ÆS, (αιω, æs, fire, light, ether, Heb αιως, from αιθω, *to burn like ether*, i e *with a blue, radiant flame*) Copper, Venus Æs, indeed, is a name given by the ancients to brass and copper indiscriminately, for it was not till a late period that these metals were distinguished. The ancients considered brass as only a more valuable kind of copper; and when the difference of their nature came to be discovered, copper was called æs cyprium from Cyprus, where the best copper was found, and afterwards only cyprium, which in time was converted into CUPRUM, which &c

Æs Per æs et libram, was a formula in the Roman law, by which purchases and sales were ratified The phrase was originally used in speaking of things sold by weight, or by scales, but it was afterwards used on other occasions Hence, in adoptions, the formula expressed that the person adopted was bought per æs et libram

ÆS UXORIUM, in antiquity, a sum paid by bachelors as a penalty for living single beyond a certain age A tax first imposed under the censorship of M Furius Camillus

ÆSALON, in ornithology, a species of falcon, called in English, the Merlin

ÆSCHINES a disciple of Socrates, was the son of a sausage-maker He went to the court of Dionysius, the tyrant of Sicily afterwards he kept a school at Athens for his support His dialogues are so much in the manner of Socrates, that Menedemus charges him with having stolen them from that philosopher Only three of them are now extant, of which, Mr Le Clerc published a Latin translation, with notes, in 1711, 8vo

ÆSCHINES, an Athenian orator, who flourished about 342 B C and distinguished himself by his rivalship with Demosthenes When the Athenians wished to reward the patriotic labours of Demosthenes with a golden crown, Æschines impeached Ctesiphon, who proposed it, and to their subsequent dispute we are indebted for the two celebrated orations de corona Æschines was defeated by his rival's superior eloquence, and banished to Rhodes In his banishment the orator repeated to the Rhodians, what he had delivered against Demosthenes, and after receiving much applause, he was requested to read the answer of his antagonist It was received with greater marks of approbation, but, exclaimed Æschines, "How much more would your admiration have been raised, had you heard Demosthenes himself speak it!" Æschines died in the 75th year of his age, at Rhodes, or, as some suppose, at Samos He wrote three orations, and nine epistles, which, from their number, received the name, the first of the Graces, and the last of the Muses The orations alone are extant, generally found collected with those of Lysias

ÆSCHYLUS, the tragic poet, was born at Athens, according to Stanley, in the 63d Olympiad, but others say later He was in the sea-fight at Salamis, in which his brother, Aminias, most gallantly distinguished himself Ælian records, that Æschylus being afterwards accused of blasphemy, was sentenced to be stoned to death, on which, his brother exhibited his arm, which had lost a hand at Salamis, and thereby made such an impression on the judges, that they immediately pardoned Æschylus This behaviour of his countrymen, added to the resentment which he felt at the preference shewn to the pieces of Sophocles, induced him to retire to Sicily Of ninety tragedies, the fruit of his ingenious labours, forty of which were rewarded with the public prize, only seven have come safe to us Prometheus vinctus, Septem duces apud Thebas, Persæ, Agamemnon, Choephori, Eumenides, Supplices Æschylus is the first who introduced two actors on the stage, and clothed them with dresses suitable to their character He likewise removed murder from the stage It is said that he wrote an account of the battle of Marathon, in elegiac verses He died, it is commonly asserted, of a fractured skull occasioned by an eagle letting fall a tortoise from a great height on his head, this happened in the 69th year of his age Æschylus, says Dr Blair, exhibits both the beauties and defects of an early original writer He is bold, nervous, and animated, but very obscure and difficult to be understood, partly by reason of the incorrect state in which his works have been transmitted to us and partly on account of the nature of his style, which is crowded with metaphors, often harsh and tumid He abounds with martial ideas and descriptions He has much fire and elevation, less of tenderness than force He delights in the marvellous The best edition of this author is that of Stanley, printed first at London in 1663, fol and since by Paaw, at the Hague, 2 tom 4to 1745 Mr Potter published an elegant translation of Æschylus, in English verse, in 1777 Mr Samuel Butler is preparing (1804) a republication of Stanley's Æschylus, in 8vo with many additional notes by Stanley, from his MSS preserved in the public library at Cambridge To these Mr Butler will add several notes of his own

ÆSCHYNOMENE Bastard sensitive-plant A genus of the Linnean class and order diadelphia decandria, with calyx two-lipped, loment compressed, and truncate one-seeded joints It has nine species, most of which are common to both Indies Among ourselves, it is chiefly cultivated for the beauty of its flowers, for only two species of it are found to be sensitive in any degree, the Æ sensitiva and Æ Americana

ÆSCULAPIUS, in the heathen mythology, the god of physic, was the son of Apollo, by Coronis, or as some say, by Larissa daughter of Phlegias His father gave him to be educated to Chiron, who taught him the art of medicine Æsculapius became physician to the Argonauts He restored many to life, of which Pluto complained to Jupiter, who

struck Æsculapius with thunder. Æsculapius received divine honours after death, chiefly at Epidaurus, Pergamus, Athens, Smyrna, &c. Goats, bulls, lambs, and pigs, were sacrificed to him, and the cock and the serpent were sacred to him. Æsculapius is represented with a large beard, holding in his hand a staff, round which is wreathed a serpent; his other hand is sometimes supported on the head of a serpent, as the ancient physicians used it in their prescriptions. He had two sons, famous for their skill in medicine, Machaon and Podalirius, and four daughters, of whom Hygeia, goddess of health, is the most celebrated.

ÆSCULAPIUS, in astronomy, a name of the constellation Ophiuchus.

ÆSCULUS. The horse-chesnut. A genus of the Linnæan class and order heptandria monogynia. Its calyx is one-leaved, four or five toothed, inflated; corol four or five petalled, unequally coloured, inserted on the calyx; capsule three celled. It has three species, all of which have been cultivated in our own country for nearly a century. 1. Æ. hippocastanum, or common-horse-chesnut, of elegant shape and flower, but unsightly after the fall of the flower, whose nuts may be employed as food for sheep, deer, and poultry. 2. Æ. pavia, or scarlet horse-chesnut. 3. Æ. flava, or yellow horse-chesnut, both of which are chiefly propagated for the beauty of their corols.

ÆSCULUS HIPPOCASTANUM (from *esca*, food.) The systematic name for the Hippocastanum.

ÆSICA, in ancient geography, is supposed to have been the place of the present village of Netterby in Cumberland.

ÆSON, son of Cretheus, was born at the same birth as Pelias. He succeeded his father in the kingdom of Iolchos. He married Alcimede, by whom he had Jason, whose education he entrusted to Chiron, being afraid of Pelias. When Jason was grown up, he demanded his father's kingdom from his uncle, who persuaded him to go in quest of the golden fleece (vid. JASON). At his return, he found his father very infirm; and Medea (vid. MEDEA), at his request, drew the blood from Æson's veins, and refilled them with the juice of certain herbs which she had gathered; and immediately the old man recovered the vigour and bloom of youth.

ÆSOP, the fabulist, was a Phrygian by birth, and lived in the time of Solon, about the 50th Olympiad. He was a slave, and exceedingly deformed. If he were not the inventor of fables, he certainly was the improver of that method of writing. He was first a slave at Athens, where, probably, he acquired a correct knowledge of the Greek language in its purity. He came into the service of a philosopher named Xanthus, from whom he passed to one Idmon, another philosopher, who gave him his liberty. He was afterwards taken into the service of Crœsus, who employed him on several occasions, and at last sent him to Delphos to offer a sacrifice to Apollo, and to make a present to the inhabitants; but a quarrel arising between Æsop and the Delphians, he sent back the sacrifice and treasures to the king, upon which, the people in a rage threw him off a rock, and slew him. The place being afterwards visited with a plague, the oracle declared it was in consequence of the death of Æsop, upon which, the Delphians, by way of atonement, erected a monument to his memory. The best edition of Æsop is that of Hudson, at Oxford, in 1718. Of this work the following is the opinion of Gottl. Stolle: "This is the best edition of Æsop with which I am acquainted. The editor has not only given us a life of Æsop, but has also illustrated it with so many testimonies from the ancients, that, from an ordinary mind, every doubt must vanish respecting the existence of such a person as Æsop." It would, however, be unjust were we not here to state that Housinger's editions of 1741 and 1756, and Ernesti's of 1781, are very admirable.

ÆSTIMATIO CAPITIS, a term met with in old law books for a fine paid for offences against persons of quality, according to their several degrees, or heads.

ÆSTINA. A name given by Fabricius to certain species (constituting a tribe) of the sibellula, or dragon fly. See SIBELLULA.

ÆSTIVAL. *a.* Something connected with, or belonging to summer: as æstival signs, i. e. Cancer, Leo, and Virgo.

ÆSTIVATION. The disposition of the petals within the floral gem or bud. This is 1. Convolute, when the petals are rolled up like a scroll of paper. 2. Imbricate, when they lie over each other like tiles on a roof. 3. Conduplicate, when they are doubled together at the midrib. 4. Valvate or valved (valvata), when as they are about to expand they are placed like the glumes in grasses. 5. Unequally-valved, when they differ in size.

ÆSTRUS (οιστρος.) The gadfly. See OISTRUS and OESTRUS.

ÆSTUARIUM (from *æstuo*, to be hot.) A stove or machine for conveying heat to all parts of the body. A vapour-bath.

ÆSTUS VOLATICUS (*æstus*, heat, and *volo*, to fly.) A sudden heat and redness of the face, which soon flies off. Few volage. Eczema.

ÆSTUARY, in the ancient baths, a secret passage from the stove into the chambers.

ÆSYMNIUM, in antiquity, a monument erected to the memory of the deceased heroes by Æsymnus the Megerean.

ÆTHER (אתר, ethar, a large space, Syr. or αιθηρ, from αιθω, to burn.) 1. The firmament. 2. The electric gas. 3. A gaseous volatile fluid in medicine, obtained by distillation from a mixture of alcohol and a concentrated acid. It is much lighter, more volatile, and inflammable than rectified spirit of wine, and possesses stomachic and antispasmodic powers.

ÆTHER, also denotes the medium said by ancient philosophers to exist in the regions

above our atmosphere, and supposed of so subtile and penetrating a nature, as to pervade the air, and other bodies, and possess the pores and intervals of all matter. The term æther has ever been embarrassed with vague ideas, yet it has frequently been resorted to by philosophers as a sort of stepping-stone whereby difficulties are thought to be surmounted, but unless its existence can be more clearly proved than has yet been done, the use of the word had, perhaps, better be abandoned. The Cartesians used the term Materia subtilis, which is their æther, and Sir Isaac Newton makes allusions to a similar medium, under the term subtil spirit, at the end of his Principia, and under the term æthereal medium in some queries at the end of his Optics. Indeed most philosophers have, at one time or another, brought forth some figment of their own fancy, in order to avoid the supposition of action among bodies at a distance. Even the great Newton seemed to show some disposition to account for gravitation by the action of a contiguous fluid. This is the subterfuge so much recurred to by precipitate speculatists, by the name of the æther of Sir Isaac Newton. He supposes it highly elastic, and much rarer in the pores of bodies and in their vicinity than at a distance, therefore exceedingly rare in the sun, and denser as we recede from him. Being highly elastic, and repelled by all bodies, it must impel them to that side on which it is most rare, therefore it must impel them toward the sun. This is enough of its general constitution to enable us to judge of its fitness for Newton's purpose. It is wholly unfit, for since it is fluid, unequally dense and elastic, its particles are not in contact. Particles that are elastic, and in a state of compression, and in contact, cannot be fluid, they must be like so many blown bladders compressed in a box, therefore they are not in contact, therefore they are elastic by mutual repulsion, that is, by acting on each other at a distance. It is indifferent whether this distance be a million of miles, or the millionth part of a hair's breadth, therefore this fluid does not free Newton from the supposition which he wishes to avoid. Nay, it can be demonstrated, that in order to form a fluid which shall vary in density from the sun to the extremity of the solar system, there must be a mutual repulsion extending to that distance. This is introducing millions of millions of the very difficulties which Newton wished to avoid, for each particle presents the same difficulty with a planet. It is asserted also, that this medium penetrates the substance of bodies even to their very centres. But we would ask, how can a subtile medium, let it be as subtile as we please to imagine, penetrate the solid substance of bodies? It is still matter, and solid, resisting matter: otherwise it could impress no force. And that one part of solid substance should penetrate another part of it, is inconceivable, and destroys the very conception of body. It is also asserted, very arbitrarily, that this medium is denser at the surface of great bodies, than at the surface of those which are less, because the gravitation is stronger towards great bodies than towards those that are less, if the distances be equal. But this, it might easily be shewn, would completely disorder the motions of the planets. In fine, the density of this medium would be inversely as the squares of the distances from remote bodies, and inversely also as the squares of the distances from other near bodies. That is, it would be very dense, and very rare, at the same place, and in the same time: and its impulses would be opposite and inconsistent among themselves, having many different, and even contrary, motions at once. Let those who imagine the reality of this medium, reconcile these properties of it to truth and nature. We really think it injurious to the reputation of this prince of philosophers, and a very ill office done to his memory, to bring in his authority for a thing, which he owns to be merely conjectural, or rather, which he asks only by way of query. However much, therefore, we regard the authority of Newton, we still think we are bound, even out of regard to him, to hold his conjecture as a conjecture: for we have never heard that since his time any new evidence has been found of the existence of this medium: and to admit it without proof, though on the authority of Newton, has a tendency, with the unthinking, to lessen his authority in other points.

This subject has been maturely considered in the appendix to Baxter on the Soul, p. 22 to 38, and in Reid's Essay on the intellectual Powers of Man, p. 87.

ÆTHER VITRIOLICUS. Naptha vitrioli. Vitriolic ether of the pharmacopœias is termed sulphuric æther in the new chemical nomenclature. It is mostly employed as an excitant, nervine, antispasmodic, and diuretic in cases of spasms, cardialgia, enteralgia, fevers, hysteria, cephalalgia, and spasmodic asthma: externally it cures tooth-ach and violent pains of the head.

ÆTHEREAL, *a.* Something that belongs to, or partakes of the nature of æther.

ÆTHEREAL OIL, a fine, subtile, essential oil, approaching nearly to the nature of a spirit: as the æthereal oil of turpentine, which is the pure liquor rising next after the spirit in the distillation of turpentine.

ÆTHIOPS, or ÆTHIOPS MINERAL, or HYDRARGYRUS CUM SULPHURE, a preparation of mercury, made by rubbing in a marble or glass mortar, equal quantities of quicksilver and flowers of sulphur, till the mercury wholly disappears, and there remains a fine deep black powder, whence it has got the name of æthiops, and it is much used in medicine.

ÆTHIOPS ANTIMONIALIS, a combination of the sulphurets of antimony and mercury: it is prepared by fusing crude antimony in an earthen crucible, and when it is on the point of fixing, add to it an equal weight of hot mercury: the mixture at first becomes more fluid, and after a while solid: when cold it must be levigated in a mortar, and washed.

The medical effects of this preparation in small quantities are sudorific, in larger doses a purgative and emetic

ÆTHIOPS VEGETABILIS is prepared by burning the sea-wrack or sea-oak in the open air, and then reducing it into a black powder It is used in scrophulous swellings, and in cleansing the gums and teeth

ÆTHMOID ARTERY and BONE See ETHMOID ARTERY and BONE

ÆTHNA (אתונא, æthuna, *a furnace*, Heb αιθνα, from αιθω, *to burn*) 1 A subterraneous fire 2 A chemical furnace

ÆTHORES, or ÆTHOLICES (from αιθω, *to burn*) Hot cutaneous pustules

ÆTHUSA MEUM The systematic name for the meum athamanticum, which see

ÆTHUSA Lesser hemlock, or fool's-parsley A genus of the class and order pentendria digynia Its fruit is striate, involucrets halved, three-leaved, pendulous There are three species, of which the A cynapium, with uniform leaves, is common to our own corn-fields

ÆTIA (αιτια, *a cause*) In medicine, the cause of a disease

AETIANS, in church history, a branch of Arians, who maintained, that the Son and Holy Ghost are in all things dissimilar to the Father

ÆTIOLATION, a term denoting the state of vegetables which, by growing in the shade, and being deprived of light, become pale, white, and insipid How this change is produced, the present state of our knowledge will not permit us to explain, but it is a fact of general observation, that the colour of herbs is pale or deep in proportion as they are less or more exposed to the rays of the sun, and those which, for the want of those rays, are pale or white, are said to be ætiolated, from a French word signifying star, as if they grew by star-light See COLOURS

ÆTIOLOGY (*ætiologia*, αιτιολογια, from αιτια, *a cause*, and λογος, *a discourse*) The doctrine of the causes of diseases

AETION, a celebrated painter, who has left us an excellent picture of Roxana and Alexander, which he exhibited at the Olympic games it represents a magnificent chamber, where Roxana is sitting on a bed of a most splendid appearance, which is rendered still more brilliant by her beauty She looks downwards, in a kind of confusion, being struck with the presence of Alexander standing before her A number of little Cupids flutter about, some holding up the curtain, as if to shew Roxana to the prince, whilst others are busied in undressing the lady, some pull Alexander by the cloak, who appears like a young bashful bridegroom, and present him to his mistress he lays his crown at her feet, being accompanied by Ephestion, who holds a torch in his hand, and leans upon a youth, who represents Hymen Several other little Cupids are represented playing with his arms, some carry his lance, stooping under so heavy a weight, others bearing along his buckler, upon which one of them is seated, whom the rest carry in triumph, another lies in ambush in his armour, waiting to frighten the rest as they pass by This picture gained Aetion so much reputation, that the president of the games gave him his daughter in marriage

ÆTIOR PHLEBES (from αετη, *an eagle*, and φλεψ, *a vein*) Eagle veins an appellation given by Ruphus Ephesius to the veins which pass through the temple to the head in animals generally, but which in eagles are peculiarly prominent

ÆTITÆ, or ÆTITES, a name given to pebbles or stones of any kind, which have a loose nucleus rattling within them, and called in English eagle stones So far from being a particular genus of fossils themselves, we find ætitæ among very different genera, but the most valued is that formed of the several varieties of our common pebbles

AETIUS, one of the most zealous defenders of Arianism, was born in Syria, and flourished about the year 336 After being servant to a grammarian, of whom he learned grammar and logic, he was ordained deacon, and at length bishop, by Eudoxus patriarch of Constantinople St Epiphanius has preserved 47 of his propositions against the Trinity His followers were called Aetians

ÆTNA (in the itineraries *Æthana*, supposed from αιθω, *to burn*, according to Bochart, from *Athuna*, a furnace, or *Ætuna*, darkness, now *Monte Gibello*) A volcano or burning mountain of Sicily, situated in lat 38 N long 15½ E —This mountain, famous from the remotest antiquity both for its bulk and terrible eruptions, stands in the eastern part of the island, in a very extensive plain, called Val Demoni, from the notion of its being inhabited by devils, who torment the spirits of the damned in the bowels of this volcano Authors are not agreed as to its dimensions, or its height above the surface of the sea The accounts given of the phænomena which have accompanied its eruptions, by sir William Hamilton and Mr Brydone, are exceedingly interesting According to the observations of the last-mentioned traveller, the height of Ætna is about 12,000 feet Faujas de S Fond states it at 10,036 feet The circumference of the base is commonly reckoned about 180 miles There are 77 cities, towns, and villages, scattered over different parts of the sides of this mountain, and the number of its human inhabitants above 100,000 The distance from Catania to the summit exceeds 30 miles The fire which is continually burning in the bowels of this mountain led the poets to place here the forges of the cyclops, under the direction of Vulcan, and the prison of the giants who rebelled against Jupiter The eruptions of this mountain have likewise been described by several of the ancient poets, as Pindar, Virgil (Æneid, b iii v 571), and Lucretius (lib vi v 639) Pindar in the fifth decade of an ode which was composed in the 78th Olympiad, about four or five years after the second eruption mentioned by Thucydides, has a passage thus translated by West

Now under sulph'rous Cuma's sea-bound coast,
And vast Sicilia lies his shaggy breast;
By snowy Ætna, nurse of endless frost,
The pillar'd prop of Heav'n for ever press'd:
Forth from whose nitrous caverns issuing rise
Pure liquid fountains of tempestuous fire,
And veil in ruddy mists the noon-day skies,
While wrapt in smoke the eddying flames aspire, [roar,
Or gleaming through the night with hideous
Far o'er the redd'ning main huge rocky fragments pour.

The last two eruptions of this volcano we have seen described, took place in July and October, 1787. In the latter of these the stream of lava that issued from the crater was three miles long, about a quarter of a mile broad, and from five to eighteen feet deep.

ÆTNA SALT, *Sal Ætna*, a name given by some to the sal ammoniac, which is found on the openings of Ætna, and other burning mountains; and sometimes on the surface of the matter thrown out during an eruption. It is sometimes found in cakes, and sometimes in powder, and its colour is either green, yellow, or white. This salt is composed of nitre, sulphur, and vitriol, and is supposed to be formed during the burning of the mountain.

AFFECTED, in algebra, is sometimes applied to equations in the same sense as adfected. Algebraic quantities which have co-efficients, or any of the characters +, —, √, &c. prefixed, are also said to be affected with the co-efficient, or respective sign.

AFFECTEDNESS. *s.* (from *affected*.) The state of being affected.

AFFECTION, in a general sense, implies an attribute inseparable from its subject. Thus magnitude, figure, weight, &c. are affections of all bodies; and love, fear, hatred, &c. are affections of the mind.

AFFECTION, signifying a settled bent of mind toward a particular being or thing, occupies a middle space between disposition, on the one hand, and passion on the other. It is distinguishable from disposition, which being a branch of one's nature, originally, must exist before there can be an opportunity to exert it upon any particular object; whereas affection can never be original, because, having a special relation to a particular object, it cannot exist till the object have once at least been presented. It is also distinguishable from passion, which, depending on the real or ideal presence of its object, vanishes with its object; whereas affection is a lasting connection, and, like other connections, subsists even when we do not think of the person. Dr Cogan, in his Philosophical Treatise on the Passions, very properly distinguishes between affection and passion, and he accurately discriminates between both these terms, and that feeling which is usually denominated emotion. The term affection, he says, has a different signification from either of the other two, and represents a less violent, and generally a more durable, [illegible] upon the [illegible] to the manner in which we are affected by them for a continuance; and supposes a more deliberate predilection and aversion, in consequence of the permanent influence of some prevailing quality. This distinguishes it from the transient impulse of passion; nor is it so intimately connected with any external signs, which distinguishes it from emotions. The affections sometimes succeed to passions and emotions, because these may have been excited by something that becomes permanently interesting, or they may be gradually inspired, by a deliberate attention to the good or bad qualities of their objects. In this philosophic sense of the word, affection is applicable to an unpleasant as well as pleasant state of the mind, when impressed by any object or quality: it may be produced by any thing that torments or corrodes the heart, as well as by that which charms and delights it. Custom, however, chiefly appropriates the term to the kind and benevolent affections. Cogan on the Passions, p. 10.

AFFECTION (*affectus*, or *affectio*, from *afficio*, to disturb.) In medicine, a peculiar disposition of the mind or body to disease or health.

AFFECTIONATE. *a.* (*affectionné*, Fr. from *affection*.) 1. Full of affection, warm, zealous (*Sprat*). 2. Fond, tender (*Sidney*). 3. Benevolent, tender (*Rogers*).

AFFECTIONATELY. *ad.* (from *affectionate*.) Fondly, tenderly, benevolently.

AFFECTIONATENESS. *s.* (from *affectionate*.) Fondness, tenderness, good-will.

AFFECTIONED. *a.* (from *affection*.) 1. Affected, conceited: obsolete (*Shakspeare*). 2. Inclined, mentally disposed (*Rom.*)

AFFECTIOUSLY. *ad.* (from *affect*.) In an affecting manner.

AFFECTIVE. *a.* (from *affect*.) That does affect, that strongly touches (*Rogers*).

AFFECTUOSITY. *s.* (from *affectuous*.) Passionateness.

AFFECTUOUS. *a.* (from *affect*.) Full of passion: little used.

AFFERORS, AFFERATORES, in law, persons appointed in court-leets, and other places, upon oath, to settle and moderate the fines of such as have committed faults arbitrarily punishable, or which have no express penalty set down by statute. See Stat. 25 Edw. III. cap. 7.

AFFETTUOSO, or CON AFFETO, in the Italian music, intimates that the part to which it is added ought to be played in a tender affecting way, and consequently rather slow than fast.

AFFIANCE. *s.* (*affiance*, from *affier*, Fr.) 1. A marriage contract (*Spenser*). 2. Trust in general, confidence (*Shaks.*). 3. Trust in the divine promises and protection (*Atterb.*)

To AFFIANCE. *v. a.* (from the noun.) 1. To betroth; to bind any one by promise to marriage (*Spens.*) To give confidence (*Pope*).

AFFIANCER. *s.* (from *affiance*.) He that makes a contract of marriage between two parties.

AFFIDATION, AFFIDATURE. *s.* (from *affido*, Lat. See AFFIED.) Mutual contract, mutual oath of fidelity.

AFFIDAVIT *s* (*affidavit* signifies, in the language of the common law, *he made oath*) A declaration upon oath (*Spectator*)

AFFIED *particip. a.* (from the verb *affy*, derived from *affido*) Joined by contract, affianced (*Shakspeare*)

AFFILIATION *s* (from *ad* and *filius*, Lat) Adoption, the act of taking a son (*Chambers*)

AFFINAGE *s* (*affinage*, Fr) The act of refining metals by the coppel

AFFINDRA (*αφιδρε*, from *αφιδροω*, *to perspire*) Cerus. In ancient medicine so named from a power ascribed to it of promoting perspiration, a quality for which it is never employed in modern times

AFFINED *a* (from *affinis*, Lat) Related to another (*Shakspeare*)

AFFI'NITY *s* (*affinité*, Fr from *affinis*, Lat.) 1 Relation by marriage 2 Relation to, connection with The Romanists talk of a spiritual affinity, contracted by the sacrament of baptism and confirmation —In that church, a god-father may not marry with his god-daughter without a dispensation Affinity does not found any real kinship, it is no more than a kind of fiction, introduced on account of the close relation between husband and wife It is even said to cease, when the cause of it ceases Hence a woman who is not capable of being a witness for her husband's brother, during his life-time is allowed to be a witness, when a widow by reason the affinity is dissolved Yet with regard to the [illegible] marriage, affinity is not dissolved by [illegible], though it be in every thing else

Affinity in the civil law, is divided into civil, that between free persons, and servile, that between slaves

Affinity, legitimate, is that contracted by a proper and legal matrimony, or, between slaves, by contubernium

Affinity, illegitimate, that contracted out of legal marriage Affinity may be contracted by an unlawful commerce thus a person who has impregnated two sisters, is prohibited marrying either of them, thus an affinity may commence between husband and wife, by his lying with her sister

Affinity is also used to denote conformity or agreement Thus we say, the affinity of languages, the affinity of words, the affinity of sounds, &c

Affi'nity, in natural philosophy, 1 The tendency which the particles of matter have to be attracted or united to each other 2 Elective attraction (in chemistry) simple, reciprocal, or double 3 Sympathy or consent of parts (in physiology) The power by which one organ is affected by another, whether directly or inversely See **Sympathy**

Affinity, chemical, is that power by which the particles of different bodies are combined, so as out of two or more substances to form one uniform whole, which is not decomposable by mechanical means, and the properties of which are often different from those of the substances of which it is formed Thus affinity exists in very different degrees among different bodies, and its varieties are among the most wonderful objects of chemical research The term is synonymous with the elective attraction of Bergman, and is called by some other chemists the attraction, or affinity of composition Like many other terms, in common as well as scientific language, it is of metaphorical origin, and in this sense may be called the series of relationships between simple substances From the appearance of certain external characters of resemblance between different animals, zoologists have contended for the existence between them of certain natural connexions, or family relationships, and have hence systematically arranged the animal kingdom into distinct tribes or families From a similar appearance among plants, a similar system has been adopted by botanists From the appearance of certain internal powers of reciprocal attraction between bodies of a simpler and more elementary form, chemists have, in like manner, contended for a similar series of connexions or relationships between these last, and to these connexions or relationships they have given the name of affinities

Chemical affinity may, therefore, be regarded as the principle of chemical action chemical attraction as the same principle in a state of operation, by which alone the degree of affinity is graduated or measured for the affinity still exists whether the attraction be taking place or not Hence where the attraction is strong, we assert the affinity to be close, where it is weak we assert it to be remote Yet in common language the terms are often used convertibly, and chemical or elective attraction, and chemical or elective affinity are often employed, though not always with strict propriety, to explain each other While the attraction of the philosopher takes place between masses situated at a greater or less distance from each other, the affinity of which we have been treating operates only upon heterogeneous particles at imperceptible distances, or in the vicinity of contact A general idea of this affinity may be obtained from the following experiment Common salt, when thrown into pure water, melts, and very soon diffuses itself through the whole of the liquid, as may be known by the taste The salt is now combined with the water, and cannot be separated by filtration or any mechanical means But if a quantity of spirit of wine be poured into the solution, the whole of the salt immediately falls to the bottom The particles of the salt unite with those of the water in consequence of the attraction or affinity which subsists between them spirit of wine has also an affinity for water, much stronger than salt has, and it is in consequence of this superior affinity that the water leaves the salt to unite with the spirit of wine, and the salt, being unsupported, necessarily falls by its gravity All substances which are capable of combining together, are said to have an affinity for each other those, on the contrary, which do not unite, are said to have no affinity for each

other. The first of these may be instanced in the above experiment; and the last, in water and oil, which, having no mutual affinity, cannot be made to combine. It appears also, that substances differ in the degree of their affinity for other substances; since, in our experiment, the spirit of wine displaced the salt and united with the water, and consequently has a stronger affinity for water than salt has.

As this affinity is the great agent in all the operations of nature and art, that are referable to the science of chemistry, a consideration of its nature is an object of the utmost importance. While its laws are unknown, chemistry is not a science, but a wilderness of facts, without beauty, without order, and almost without utility. It is the knowledge of affinity which guides us in our investigation of the phænomena of nature, which shews us their order, and points out their mutual dependence, and which enables us to direct them as we think proper, to make them subservient to the improvement of the arts, and thus to render them the ministers of our comforts and enjoyments. The general principles, or laws, which are observed in the operations of this power, are the following. 1. It takes place between the constituent or integrant particles of bodies of different natures, for when two bodies are united by affinity, how small a portion soever of the compound we examine, we shall always find it to contain both of the ingredients, and the bodies must be of different natures, otherwise the only power that would be exerted is that of cohesion, or, as it is called, the affinity of aggregation. 2. Its efficacy is in the inverse ratio of the affinity of aggregation, for, as it is the latter power which combines the integrant and homogeneous particles, and holds them together, it so far hinders them from separating in order to join the parts of another body, and therefore the greater this force is, the less efficacious is the affinity of composition, and vice versa. 3. When two or more bodies are united by this affinity, they suffer a change of temperature at the instant of their union. This change depends upon that produced in the degree of attraction for the matter of heat which is sometimes disengaged in the process, and sometimes absorbed. 4. The compound possesses properties different from those which each of the bodies possessed before their union. This difference takes place, not only in the taste, but also in the smell, colour, form, consistency, and fusibility of the compound. Instances are constantly occurring in chemical operations in proof of this law. 5. Bodies have not all the same degree of chemical attraction with regard to one another, but each body has its peculiar degree of affinity for other bodies. This law, which must have been observed as early as chemical phenomena were noticed, is abundantly confirmed by constant experience. 6. That bodies may unite chemically, it is, in al[...] necessary that one of them, at least, a fluid state, that of gaseous or elas[...]uidity, which is very unfavourable to combination, but the liquid or non-elastic state, whether by fusion or solution. The union in this case depends not on any superior power possessed by that body which is termed the solvent, but results from the reciprocal action of the molecules of the two bodies on each other. Although every chemical combination is produced by the operation of the same general principle, modified and directed by circumstances, yet as the phenomena vary considerably in different cases, it has been found expedient, for the sake of perspicuity, to divide them into classes, and to distinguish the various modes in which affinity operates by different names. Thus we have concurrent affinity, simple and compound affinity, disposing, quiescent, divellent, resulting affinity, &c. all which will be explained as we proceed, when the various phenomena, necessary to illustrate the subject, will present themselves. All the known instances of affinity may be arranged under the three first classes, though some chemists, and perhaps with propriety, have taken in also the fourth for this purpose. I. Concurrent affinity is that by which two or more substances are united into one homogeneous body. When two bodies are employed it is evident that, if the force of their mutual affinity is ever so little greater than the sum of their respective degrees of cohesion, combination will take place: thus, if a piece of quick lime be put into muriatic acid, the two substances will unite and form an homogeneous compound, called muriat of lime, possessing properties which differ both from those of the lime, and those of the acid. That this rule may be extended to more than two substances, will appear on mixing together sulphuric acid, alumine, and potash, the concurrent affinities being greater than the force of cohesion, the substances will unite and form common alum, a salt possessing peculiar properties, which could not be inferred from those of its elements. II. Simple affinity, or single elective attraction, is that by which a body, compounded of two substances, is decomposed on the approach of a third substance, having a greater affinity for one or both the other substances than they have for each other, and by which a new combination is produced, and a new substance is formed. Thus when a metal is dissolved by an acid, and kept in union with it by a certain degree of elective attraction, if an alkali be presented to this compound, a decomposition takes place, the alkali unites with the acid by virtue of a superior degree of affinity, and forms a new compound, while the metal is precipitated. Of the same kind is the experiment related in the beginning of this article. So also, when the sulphuric acid is combined with magnesia, forming with it the salt called sulphat of magnesia, as soon as potash is presented, the acid leaves the magnesia, which is precipitated, and unites with the potash. The following is an instance in which two combinations take place by simple affinity. When some potash is dropped into tartarous acid, part of the acid unites with the al-

kali, and forms tartarite of potash, after this the remainder of the acid combines with the tartarite just formed, and composes a new salt known by the name of acidulous tartarite of potash, or tartar. Strictly speaking, this is rather a case in which the concurrent is succeeded by the elective affinity.—In the beginning of the last century, viz. about the year 1718, Geoffroy invented a method of representing the different degrees of affinities, which he called tables of affinity. His method consisted in placing each of the substances whose affinities he wished to express at the top of a column, and the substances with which it united in the same column below it, in the order of their respective affinities. According to this method, the affinity of water for spirit of wine and for common salt would be marked thus:

WATER
———
Spirit of wine
Common salt

This method has been universally adopted by succeeding chemists, and has contributed very much to the advancement of the science. Geoffroy's table consisted of 17 columns, and in 1750 Gellert published a new table extended to 28 columns, at the bottom of each of which was a list of substances which he had found not to be acted upon by the body at the head of the column. Rudiger in 1756 gave a table of affinity reduced to 15 columns. M. Limbourg, in 1758, extended the number of columns to 33, and otherwise much improved the tables. From this period, the importance of the subject being fully established, tables were multiplied, and the general system of affinity was investigated by the most able chemists. At length, in 1775, the illustrious Bergman published his dissertation on elective attractions, and successive editions of his tables made their appearance in 1779 and 1783. In these tables, which do honour to the skill and industry of their author, the affinities of no less than 59 substances are clearly ascertained, and the distinction made between those that take place in the moist and in the dry way. His method of registering cases of compound affinity, will be noticed when we come to that part of our subject. The following tables are improved and enlarged from Bergman's by Dr Pearson, and corrected by the latest discoveries. Their utility is almost unspeakable, for they enable us to discover any particular fact we are enquiring after, as far as simple affinity is concerned, and to compare and foretel, by inspection, the results of a great variety of processes and experiments.

TABLE I. SIMPLE ELECTIVE AFFINITIES.

In Water, or by Solution.

1. Caloric.

Oxygen
Ether
Alcohol
Ammonia
Water
Volatile oils
Glass
Mercury
Platina
Mercury
Gold
Nitrous gas
Muriatic acid
Nitrous acid
Sulphuric acid
White Oxyd of Manganese
Hydrogen?

Bases of all gases

2. Oxygen.

Bases of Muriatic and other undecomposed acids
Carbon
Phosphorous
Sulphur
Light?
Zinc
Copper
Lead
Iron!
Silver
Platina
Mercury
Gold
Nitrous gas
Muriatic acid
Nitrous acid
Sulphuric acid
White Oxyd of Manganese
Hydrogen?
Volatile oils
Alcohol
Water

3. Sulphur.

Oxygen
MolybdicOxyd and acid
Oxyd of lead
——— tin
——— silver
——— mercury
——— arsenic
——— antimony
——— iron
Fixed alkalies
Barytes
Strontian
Lime
Magnesia
Phosphorus
Fat oil
Ammonia
Ether
Hydrogen gas?

4. Saline Sulphurets.

Oxygen
Oxyd of gold
——— silver
——— mercury
——— arsénic
——— antimony
——— bismuth
——— copper
——— tin
——— lead
——— nickel
——— cobalt
——— manganese
——— iron
Other metallic oxyds
Carbon
Water
Alcohol
Ether?

5. Silex.

Fluoric acid
Potash
Soda
Barytes?
Strontian?

6. Alumine.

Sulphuric acid
Nitric a.
Muriatic a.
Fluoric a.
Arsénic a.
Oxalic a.
Suberic a.
Tartarous a.
Phosphoric a.
Acetous and other acids
Alkalies
Barytes?
Strontian?

7. Barytes.

Sulphuric a.
Oxalic a.
Succinic a.
Fluoric a.
Phosphoric a.
Saccholactic a.
Molybdic a.
Nitric a.
Muriatic a.
Suberic a.
Sebacic a.
Citric a.
Tartareous a.
Arsénic a.
Formic a.
Lactic a.
Benzoic a.
Acetous a.
Boracic a.
Sulphureous a.
Nitrous a.
Carbonic a.
Prussic a.
Fixed alkali
Lime?
Water?

Fat oil
Sulphur

8 *Strontia.*

Sulphuric acid
Oxalic a
Tartarous a
Fluoric a
Nitric a
Muriatic a
Succinic a
Phosphoric a
Acetous a
Arsénic a.
Boracic a
Carbonic a
Other acids?
Fixed alkalies
Water
Fat oil
Sulphur
Hydrosulphuret

9 *Lime*

Oxalic acid
Sulphuric a
Tartaric a
Succinic a
Phosphoric a
Saccholactic a
Nitric a
Muriatic a
Suberic a
Sebacic a
Fluoric a
Arsénic a
Formic a
Lactic a.
Citric a
Benzoic a
Acetous a
Boracic a
Sulphurous a
Nitrous a
Carbonic a
Prussic a
Barytes?

Water
Fat oil
Sulphur
Phosphorus

10 *Magnesia*

Oxalic acid
Phosphoric a
Sulphuric a
Fluoric a
Sebacic a
Arsénic a
Saccholactic a
Succinic a
Nitrous a
Muriatic a
Suberic a
Tartaric a
Citric a ?
Formic a
Lactic a
Benzoic a
Acetous a
Boracic a
Sulphurous a
Carbonic a
Prussic a
Sulphur

11, 12, 13 *Potash, Soda, Ammonia*

Sulphuric acid
Nitric a
Sebacic a
Muriatic a
Suberic a
Fluoric a
Phosphoric a
Oxalic a
Tartaric a
Arsenic a
Succinic a
Citric a
Formic a
Lactic a
Benzoic a.
Acetic a
Saccholactic a
Boracic a.
Sulphurous a.
Nitrous a

Carbonic a
Prussic a
Water
Fat oil
Sulphur
Metallic oxyds
See No 15

14 *Water*

Potash
Soda
Ammonia
Alcohol
Carbonat of Ammonia
Ether
Sulphuric acid
Sulphat of Potash
——— alumine
——— iron
Oxymuriat of mercury
Other compounds, not decomposed by Sulphuric a
Silex

15, 16 *Sulphuric and Sulphurous acids*

Barytes
Strontia
Potash
Soda
Lime
Magnesia
Ammonia
Alumine
Jargonia?
Oxyd of zinc
——— iron
——— manganese
——— cobalt
——— nickel
——— lead
——— tin
——— copper

Oxyd of bismuth
——— antimony
——— arsénic
——— mercury
——— silver
——— gold
——— platina
Water
Alcohol

17, 18, 19, 20, 21 *Nitrous, Nitric, Muriatic, Oxymuriatic, Nitro-muriatic Acids*

Potash
Soda
Barytes
Strontia
Lime
Magnesia
Ammonia
Alumine
Metallic oxyds
See No 15
Water
Alcohol

22 *Fluoric Acid*

Lime
Barytes
Strontia
Magnesia
Potash
Soda
Ammonia
Alumine
Metallic oxyds
Silex
Water
Alcohol

23 *Boracic Acid*

Lime
Barytes
Strontia
Magnesia
Potash
Soda
Ammonia
Alumine
Metallic oxyds
Water
Alcohol

24, 25 *Oxalic and Tartarous Acids*

Lime
Barytes
Strontia
Magnesia
Potash
Soda
Ammonia
Alumine
Metallic oxyds
Water
Alcohol

26 *Citric Acid*

Lime
Barytes
Strontia
Magnesia
Potash
Soda
Ammonia
Alumine
Metallic oxyds
Water
Alcohol

27. Benzoic Acid.

White oxyd of arsénic
Potash
Soda
Ammonia
Barytes
Lime
Magnesia
Alumine
Tromsdorff

28 Succinic Acid.

Barytes
Lime
Magnesia
Potash
Soda
Ammonia
Alumine
Metallic oxyds
Water
Alcohol

29 Saccholactic Acid

Lime
Barytes
Magnesia
Potash
Soda
Ammonia
Alumine
Metallic oxyds
Water
Alcohol

30, 31, 32. Acetous, Lactic, and Formic Acids

Barytes
Potash
Soda
Strontia
Ammonia
Lime
Magnesia
Alumine
Metallic oxyds
Water
Alcohol

33, 34, 35 Sebacic, Phosphoric, and Arsénic Acids

Lime
Barytes
Strontia
Magnesia
Potash
Soda
Ammonia
Alumine
Metallic oxyds
Water
Alcohol

36 Prussic Acid

Metallic oxyds
Potash
Soda
Ammonia
Barytes
Strontia
Lime
Magnesia
Alumine

37 Carbonic Acid

Barytes
Strontia
Lime
Potash
Soda
Magnesia
Ammonia
Alumine
Metallic oxyds, as in No 15
Water
Alcohol

38 Chromic Acid.

Potash
Soda
Oxyd of lead
——— copper

39 Molybdic Acid

Sulphur
Potash
Soda
Absorbent earths
Metallic oxyds

40 Tungstic Acid.

Lime
Barytes
Magnesia
Potash
Soda
Ammonia
Alumine

41 Pyromucous Acid

Potash
Soda
Barytes
Lime
Magnesia
Ammonia
Alumine
Jargonia
Metallic oxyds

42 Pyro-ligneous Acid

Lime
Barytes
Potash
Soda
Magnesia
Ammonia
Metallic oxyds
Alumine

43 Oxyd of Arsénic

Muriatic acid
Oxalic a
Sulphuric a
Nitric a
Sebacic a
Tartaric a
Phosphoric a
Fluoric a
Saccholactic a
Succinic a.
Citric a
Formic a.
Arsénic a
Lactic a.
Prussic a
Potash
Ammonia
Fat oil
Water

44 Oxyd of Titanium

Sulphuric a
Nitrous a
Muriatic a
Prussic a
Oxymuriatic a
Nitromuriatic a

45 Oxyd of Uranium

Sulphuric acid
Nitromuriatic a
Muriatic a
Nitric a
Phosphoric a
Acetous a.
Gallic a
Prussic a
Carbonic a
Sulphur
Water

46 Oxyd of Tellurium

Nitrous acid
Nitromuriatic a
Sulphuric a
Sulphur
Alkalies
Mercury
Water

47 Oxyd of Manganese

Oxalic acid
Tartaric a
Citric a
Fluoric a
Phosphoric a
Nitrous a
Sulphuric a
Muriatic a
Sebacic a
Arsenic a
Acetous a
Prussic a
Carbonic a

48 Oxyd of Nickel

Oxalic acid
Muriatic a
Sulphuric a.
Tartareous a.
Nitric a.
Sebacic a
Phosphoric a
Fluoric a.
Saccholactic a
Succinic a
Citric a
Formic a.
Acetous a
Arsénic a
Lactic a
Boracic a
Prussic a
Carbonic a
Ammonia

49 Oxyd of Cobalt

Oxalic acid
Muriatic a
Sulphuric a
Tartareous a
Nitric a
Sebacic a
Phosphoric a
Fluoric a
Saccholactic a
Succinic a
Citric a
Formic a
Lactic a
Acetous a
Arsénic a
Boracic a
Prussic a
Carbonic a.
Ammonia

50 Oxyd of Bismuth

Oxalic acid
Arsénic a
Tartaric a
Phosphoric a.
Sulphuric a
Sebacic a
Muriatic a.
Nitric a
Fluoric a
Saccholactic a

Succinic a
Citric a.
Formic a
Acetous a
Prussic a
Carbonic a
Ammonia

51 *Oxyd of Antimony*

Sebacic acid
Muriatic a.
Oxalic a
Sulphuric a
Pyromucous a
Nitric a
Tartaric a
Saccholactic a
Phosphoric a
Citric a
Succinic a
Fluoric a
Arsénic a
Formic a,
Lactic a
Acetous a
Boracic a
Prussic a
Carbonic a
Sulphur

52 *Oxyd of Zinc*

Oxalic acid
Sulphuric a
Pyromucous a
Muriatic a
Saccholactic a
Nitric a
Sebacic a
Tartareous a
Phosphoric a
Citric a
Succinic a
Fluoric a,
Arsénic a
Formic a.
Lactic a.
Acetous a,
Boracic a
Prussic a
Carbonic a
Ammonia

53 *Oxyd of Iron*

Oxalic acid
Tartareous a
Gallic a
Camphoric a
Sulphuric a
Saccholactic a
Muriatic a
Pyromucous a
Nitric a
Sebacic a
Phosphoric a
Arsenic a
Fluoric a
Succinic a
Citric a
Formic a
Lactic a
Acetous a
Boracic a
Prussic a
Carbonic a

54 *Oxyd of Tin*

Pyromucous acid
Sebacic a
Tartareous a
Muriatic a
Sulphuric a
Oxalic a
Arsénic a
Phosphoric a
Nitric a
Succinic a
Fluoric a
Saccholactic a
Citric a
Formic a
Lactic a
Acetous a
Boracic a
Prussic a
Potash
Soda
Ammonia

55 *Oxyd of Lead*

Sulphuric acid
Sebacic a
Saccholactic a
Oxalic a
Arsénic a
Tartareous a,
Phosphoric a.
Muriatic a
Molybdic a
Benzoic a
Sulphureous a
Suberic a
Zoonic a
Nitric a
Pyromucous a
Fluoric a
Citric a.
Formic a
Acetous a
Lactic a
Boracic a
Prussic a
Carbonic a
Fixed alkali
Fat oil

56 *Oxyd of Copper*

Pyromucous acid
Oxalic a
Tartareous a
Muriatic a
Sulphuric a
Saccholactic a
Nitric a
Sebacic a
Arsénic a
Phosphoric a
Succinic a
Fluoric a
Citric a
Formic a
Acetous a
Lactic a
Boracic a
Prussic a
Carbonic a
Potash
Soda
Ammonia
Compound salts
Fat oil

57 *Oxyd of Mercury*

Sebacic acid
Muriatic a
Oxalic a
Succinic a
Phosphoric a
Arsénic a
Sulphuric a
Saccholactic a
Tartareous a
Citric a
Nitric a
Fluoric a
Acetous a
Boracic a
Prussic a
Carbonic a
Ammonia

58 *Oxyd of Silver*

Muriatic acid
Sebacic a
Oxalic a
Sulphuric a
Saccholactic a
Phosphoric a
Nitric a
Arsenic a
Fluoric a
Tartaric a
Citric a
Formic a
Acetous a
Lactic a
Succinic a
Prussic a
Carbonic a
Ammonia

59 *Oxyd of Platinum*

Ether
Muriatic acid
Nitromuriatic a
Nitric a
Sulphuric a
Arsénic a
Fluoric a
Tartaric a
Phosphoric a
Sebacic a
Oxalic a
Citric a
Formic a
Acetous a
Lactic a
Succinic a

60 *Oxyd of Gold*

Ether
Muriatic acid
Nitromuriatic a
Nitric a
Sulphuric a.
Arsénic a
Fluoric a
Tartaric a
Phosphoric a
Sebacic a.
Prussic a
Fixed alkalies
Ammonia

61 *Alcohol*

Water
Ether
Volatile oils
Ammonia
Fixed alkali
Alkaline sulphuret
Sulphur
Muriates
Phosphoric a

62 *Ether*

Alcohol
Volatile oils
Water
Sulphur
Phosphorus
Caoutchouc

63 *Volatile Oil*

Ether
Alcohol
Fixed oil
Fixed alkali
Sulphur
Phosphorus

64 *Fixed Oil*

Lime
Barytes
Potash
Soda
Magnesia
Ammonia
Oxyd of mercury
Other oxyds
Alumine
Various acids
Sulphur
Phosphorus

65 *Jargonia*

Vegetable acid
Sulphuric a
Muriatic a
Nitric a
[illegible]

AFFINITY.

Table II. SIMPLE ELECTIVE AFFINITIES

In Fire, or by Fusion

1. *Oxygen*

Carbon
Zinc
Iron
Hydrogen
Manganese
Cobalt
Nickel
Lead
Tin
Phosphorus
Copper
Bismuth
Antimony
Mercury at 600°
Arsénic
Sugar
Sulphur
Caloric
Gold
Silver
Platinum
Mercury at above 1000°
White oxyd of Manganese

2 *Sulphur*

Oxygen
Potash
Soda
Iron
Copper
Tin
Lead
Silver
Cobalt
Nickel
Bismuth
Antimony
Mercury
Arsénic
Uranium
Molybdena
Tellurium

3 *Saline Sulphurets.*

Manganese
Iron
Copper
Tin
Lead
Silver
Gold
Antimony
Cobalt
Nickel
Bismuth
Mercury
Arsénic
Carbon

4 *Silex*

Potash
Soda
Phosphoric acid
Oxyd of lead

5 *Alumine*

Phosphoric acid
Boracic a
Arsénic a
Sulphuric
Nitric
Muriatic
Fluoric
Sebacic
Succinic
Formic
Lactic
Benzoic
Acetous
Potash
Soda
Sulphur
Oxyd of lead

6 *Barytes*

Phosphoric acid
Boracic a
Arsénic a
Sulphuric a
Succinic a
Fluoric a
Nitric a
Muriatic a
Sebacic a
Formic a
Lactic a
Benzoic a
Acetous a
Fixed alkali
Sulphur

7, 8 *Lime, Magnesia*

Phosphoric acid
Boracic a
Arsénic a.
Sulphuric a
Succinic a
Fluoric a
Nitric a
Muriatic a
Suberic a.
Sebacic a
Formic a.
Lactic a
Benzoic a
Acetous a
Fixed alkali
Sulphur
Oxyd of lead

9, 10, 11 *Potash, Soda, Ammonia*

Phosphoric acid
Boracic a
Arsénic a
Sulphuric a
Succinic a
Fluoric a
Nitric a
Muriatic a
Sebacic a.
Formic a
Lactic a
Benzoic a
Acetous a
Barytes
Lime
Magnesia
Alumine
Silex
Sulphur

12 *Sulphuric Acid*

Potash
Soda
Barytes
Strontia
Lime
Magnesia
Jargonia
Metallic oxyds
Ammonia
Alumine

13, 14, 15, 16, 17, 18, 19, 20 *Nitrous, Nitric, Muriatic, Oxy muriatic, Acetous, Lactic, and Formic Acids*

Barytes
Potash
Soda
Strontia
Lime
Magnesia
Metallic oxyds
Ammonia
Alumine

21, 22, 23, 24, 25, 26, 27 *Fluoric, Boracic, Benzoic, Saccholactic, Sebacic, Phosphoric, and Arsenic Acids*

Lime
Barytes
Strontia
Magnesia
Potash
Soda
Metallic oxyds
Ammonia
Alumine

28 *Succinic Acid*

Barytes
Strontia
Lime
Magnesia
Potash
Soda
Metallic oxyds
Ammonia
Alumine

29 *Arsénic*

Nickel
Cobalt
Copper
Iron
Silver
Tin
Lead
Gold
Platina
Zinc
Antimony
Alkaline sulphuret
Sulphur

30 *Tellurium*

Mercury
Sulphur

31 *Manganese*

Copper
Iron
Gold
Silver
Tin
Alkaline sulphuret

32 *Nickel*

Iron
Cobalt
Arsénic
Copper
Gold
Tin
Antimony
Platina
Bismuth
Lead
Silver
Zinc
Alkaline sulphuret
Sulphur

33 *Cobalt*

Iron
Nickel
Arsénic
Copper
Gold
Platina
Tin
Antimony
Zinc
Alkaline sulphuret
Sulphur

34 *Bismuth*

Lead
Silver
Gold
Mercury
Antimony
Tin
Copper
Platina
Nickel
Iron
Zinc
Alkaline sulphuret
Sulphur

35 *Antimony.*

Iron
Copper
Tin
Lead
Nickel
Silver
Bismuth
Zinc
Gold
Platina
Mercury
Arsénic

Cobalt
Alkaline sulphuret
Sulphur

36. Zinc.

Copper
Antimony
Tin
Mercury
Silver
Gold
Cobalt
Arsénic
Platina
Bismuth
Lead
Nickel
Iron

37 Iron

Nickel
Cobalt
Arsénic
Manganese
Copper
Gold
Silver
Tin
Antimony
Platina
Bismuth
Lead
Mercury
Alkaline sulphuret
Sulphur

38 Tin

Zinc
Mercury
Antimony
Copper
Gold
Silver
Lead
Iron
Manganese
Nickel
Arsénic
Platina
Bismuth
Cobalt
Alkaline sulphuret
Sulphur

39 Lead

Gold
Silver
Copper
Mercury
Bismuth
Tin
Antimony
Platina
Arsénic
Zinc
Nickel
Iron
Alkaline sulphuret
Sulphur

40. Copper.

Gold
Silver
Arsénic
Iron
Manganese
Zinc
Antimony
Platina
Tin
Lead
Nickel
Bismuth
Cobalt
Mercury
Alkaline sulphuret
Sulphur

41 Mercury

Gold
Silver
Platina
Lead
Tin
Zinc
Bismuth
Copper
Antimony
Arsénic
Iron
Alkaline sulphuret
Sulphur

42 Silver

Lead
Copper
Mercury
Bismuth
Tin
Gold
Antimony
Iron
Manganese
Zinc
Arsénic
Nickel
Platina
Alkaline sulphuret

43 Platina

Arsénic
Gold
Copper
Tin
Bismuth
Zinc
Antimony
Nickel
Cobalt
Manganese
Iron
Lead
Silver
Mercury
Alkaline sulphuret

44 Gold

Mercury
Copper
Silver
Lead
Bismuth
Tin
Antimony
Iron
Platina
Zinc
Nickel
Arsénic
Cobalt
Manganese
Alkaline sulphuret

In the first of these tables are marked, in order, the elective affinities, as far as they are known, of 63 of the most important chemical substances The order in which these are arranged will appear on inspection, and may be illustrated by an example, the following ones will also shew the use and application of the table

If it be required to decompose an aqueous solution of muriat of soda, or common salt, being a compound formed of muriatic acid and soda, the first enquiry is, which is to be set at liberty, the acid or the soda? Suppose the acid, I am then to find a substance whose affinity with soda is greater than that of muriatic acid Turning to No 11, I find two substances, sulphuric and nitric acid, standing above the muriatic, the addition of either of these to the given solution will decompose the salt, and the acid may be obtained in a disengaged state if the soda is wanted, I find from No 17, the column containing the affinities of muriatic acid, that the affinity of potash for that acid is greater than that of soda, consequently by employing this substance, I obtain the soda free, and the potash uniting with the muriatic acid, forms muriat of potash. Again, if muriat of lime (a compound of lime and citric acid) is to be decomposed, I find from No 8, that it cannot be done so as to set at liberty the lime, because this stands first in the column, and has therefore a greater affinity for the acid than any other substance, but from the column of lime, No 8, it appears that no less than 13 acids will each of them separate the lime, so as to leave the citric acid disengaged The lime, however, may be separated by another process suppose, for instance, that muriatic acid has been employed to precipitate the citric acid, and the muriat of lime thus formed be removed into another vessel, then by referring to No 17, I learn that there are four substances that have a greater affinity for muriatic acid than lime has, and therefore the use of any one of them would join with the acid, and set the lime at liberty If the decomposition of sulphat of barytes be required, it is plain from No 6 and No. 14, that neither the barytes nor the acid can be separated in this manner All the affinities registered in this table take place through the medium of water, in which one, at least, of the substances is dissolved, and therefore the temperature cannot exceed that of boiling water but those in

The second table, are produced without the medium of water, by the agency of fire, and at a temperature equal to the fusion of at least one of the substances employed. This table contains the affinities of 45 substances, arranged in a similar manner with the former, and as its application is exactly the same, any further illustration is unnecessary.

Other contrivances have been made to express

more perfectly the different cases of simple affinity, and the circumstances attending them; the most ingenious and useful of these are the schemes of Bergman, by which we are enabled to state clearly and concisely the result of the experiment, the temperature of the substances, the menstruum in which they are dissolved, and the manner or state of the new substance. We shall here give one example of this mode of registering, and refer for others to the article ELECTIVE ATTRACTION.

Muriat of Potash

Muriat of Soda { Muriatic acid — Potash
Water 212°
Soda

This scheme expresses, that if to a boiling hot solution of muriat of soda in water, potash be added, a decomposition takes place, muriat of potash being formed, and the soda being set at liberty. The straight line under soda, and the pointless bracket under muriat of potash, express that both substances remain in solution.

III. Compound Affinity, or double elective attraction, is that which takes place when two bodies, each consisting of two principles, suffer decomposition by a reciprocal exchange and union of their elements, by which two new compound bodies are produced. In a more general sense, the term may be said to comprehend all those cases of affinity where more than three bodies are present at one time and produce combinations which would not have been formed without their united action. In all cases of compound affinity, there are two kinds of affinity to be considered, which it may be proper here to define:—

Quiescent affinity is that which tends to preserve the compounds in their first state,

Divellent affinity is that which tends to destroy the former, to separate the principles of the old compounds, and by changing their order, to form new compounds. Whenever, therefore, the sum of the divellent affinities is greater than that of the quiescent ones, a decomposition and a new combination will evidently take place.

An example will render this more familiar. Sulphat of potash, or a combination of the sulphuric acid with potash, cannot be decomposed by either quicklime or the cold nitric acid individually, but pour into a solution of the former neutral salt a proper quantity of the nitrat of lime, formed by the union of the nitric acid with quicklime, the two combinations will be mutually decomposed, the nitric acid uniting with the potash to form common nitre, while the sulphuric acid uniting with the lime forms sulphate of lime, which being less liable to solution than the nitre, is therefore precipitated. This affinity may probably appear strange and unaccountable; but it may be explained in the following manner. The sulphuric acid cannot be separated from potash, either by lime, or by the nitric acid, because it has a stronger affinity with that alkaline substance than either of the two latter bodies has with it or with the alkali. But when to the sulphat of potash a compound of the nitric acid with lime is presented, the nitric acid immediately exerts its tendency to combine with the potash, while the sulphuric acid is at the same time attracted by the lime; so that the decomposition of the sulphat of potash is begun by the action of the nitric acid, and completed by that of the lime. To explain this double affinity still more clearly, suppose the force of adhesion, which unites the sulphuric acid with potash, to be equal to eight, the nitric acid tending to unite with that alkaline substance with a less degree of force, which may be estimated at seven, would be insufficient of itself to decompose the sulphat of potash, but the lime, by its tendency to combine with the sulphuric acid, aids it with a force which we may consider as equal to six, and these two forces together amount to thirteen, which sum of forces is exerted against eight, to separate the sulphuric acid from the potash. This compound force will also be greater than that by which the union between the lime and the nitric acid is maintained.

The best method of registering the cases of compound affinity is that of Bergman, improved by Mr Elliot, who added numbers expressive of the affinities of the various substances. Place the two compounds which mutually decompose one another between two braces directly opposite, the acids standing in opposition to the bases on which they act, between these four bodies note down the particular degrees of the attractive force which they exert upon each other, then add together the two horizontal numbers, expressing the quiescent attractions, and also the vertical numbers which are employed to mark the divellent attractions. If the sum of the latter exceed that of the former, a double decomposition and a double combination will be effected. An example of this from the last-mentioned compounds will afford a sufficient explanation.

Nitre, or Nitrat of Potash

Potash — 7 — Nitric Acid

Sulphate of Potash — 8 — 4 — Nitrat of Lime

Sulphuric Acid — 6 — Lime

Sulphate of Lime

Here the quiescent affinities, or those subsisting between the sulphuric acid and the potash, and between the nitric acid and the lime = 8 + 4 = 12. And the divellent affinities, or those which dispose the nitric acid to separate from the lime and unite with the potash, and unite with the lime = 7 + 6 = 13.—Consequently a double decomposition takes place, and two new compounds, nitrat of potash and sulphat of lime, are formed. The terms divellent and quiescent affinity were first employed by Kirwan.

M Guyton has proposed the following improvements in representing the cases of compound affinity

When decomposition does not take place, nothing is to be written above and below the square.

When a new compound is precipitated, a line bent downwards in the middle is to be placed between it and the square, as in the following example

Sulphat of Potash

Sulphat of Barytes.	Sulphuric Acid	62	Potash	Carbonat of Potash
	65		9(74	
	Barytes	14 / 76	Carbonic Acid	

Carbonat of Barytes

When a new compound is sublimed, the line between it and the square is to be pointed upwards in the middle, thus

When a new compound is partly dissolved and partly precipitated, the line placed between it and the square is to have the following shape

When it is partly dissolved and partly sublimed, the following line is to be used

The relative degrees of affinity, however, are not sufficiently known to enable us to express them accurately in numbers Many attempts have been made, and different contrivances employed by Guyton, Fourcroy, Kirwan, and others, to ascertain these degrees, but hitherto without complete success the tables they have formed are frequently erroneous, as the results of experiments are often very different from what the tables would lead us to expect, and sometimes even the direct contrary As it is in cases of compound affinity that a knowledge of the exact ratios of affinities would be peculiarly useful, we earnestly hope that the continued researches of those chemists who have so ably investigated the subject will terminate in the attainment of so desirable an object

IV Disposing Affinity, so called by Guyton, is the same as that which was before known by the term affinity of intermediates, these names have been given to it, because, by the addition of an intermediate substance, it disposes bodies to unite which would not otherwise have done it Oil, for instance, does not combine with water, but a combination of oil with a salt constitutes a soap, which is soluble in water, the salt acting as an intermediate. In like manner, if sulphur be presented to oxygen gas, it does not manifest any [illegible] for it, but if it be previously combined [illegible] potash, it unites with oxygen very freely [illegible] previous union with potash, in this case, [illegible] to unite with oxygen

[illegible] Reciprocal Affinity takes place when a compound consisting of two bodies is decomposed by a third, and the separated principle again decomposes the new combination; so that the principles seem to act reciprocally The sulphuric acid has a greater affinity than the nitric acid with potash, and accordingly decomposes a combination of these two principles, but the nitric acid, when left in a separate state, has power to divide the sulphuric acid from the alkali, for by heating sulphat of potash with the nitric acid, nitre is again obtained. This kind of affinity is occasioned by two circumstances, the influence of which disturbs the general laws of chemical affinity The common nitric acid must be warmed before it can decompose sulphat of potash, and the nitre obtained by this process is again decomposed by the sulphuric acid, as soon as the mixture returns to a cold state As these apparent reciprocal affinities, however, depend upon certain combinations of caloric, light, the surrounding air, &c not hitherto sufficiently examined, their nature is, of course, but imperfectly understood

VI Resulting Affinity is a term employed by Berthollet to denote the result of the action of several affinities on the same substance Supposing the affinity of a compound body to result from those of the substances which compose it, he gives the following instance of this affinity the nitric acid is composed of oxygen and azote, this acid combines with potash, and it acts upon potash by an affinity resulting from that of the oxygen and of the azote

VII Affinity of Aggregation is that which unites the integrant particles of bodies of the same nature, it acts in opposition to the affinity of composition, of which we have been treating, and is likewise known by the term cohesion. See Cohesion and Aggregation

After giving this view of the leading phenomena of chemical affinity, and of the laws by which it appears to be regulated, we must observe that, in some cases, these laws seem liable to certain variations, which arise from the influence of particular circumstances, such as the quantity of the substances, the temperature of the atmosphere, motion or rest, solution by water or fire, the state of aggregation proper to each body, the attraction of saline vegetation, &c Bergman, by whom every part of chemistry, and this in particular, has been so much improved, has considered most of these circumstances with great attention, and has shewn how far they may be expected to vary the laws of affinity From the several facts which he has collected on this subject, he concludes that their variations can be regarded only as exceptions, by no means sufficient to weaken the evidence on which the doctrine is founded C L. Berthollet, however, in his Researches respecting the Laws of Affinity, has observed so many deviations, and has investigated them all with so much minuteness and care, as to excite in his mind a doubt of the truth of Bergman's doctrine, which depends upon the absolute uni-

formity of elective affinity, that is, on its being a constant force. Berthollet is of opinion that this is not the case, but that affinity not only produces different effects upon different objects and in different situations, but is itself a variable force, depending upon various circumstances for the absolute degree of its exertion, as well as for the quantity of its effect His treatise on this subject is well deserving the consideration of every chemist. On the subject of the present article, consult also the words ELECTIVE ATTRACTION, PRECIPITATION, SATURATION, and SOLUTION, in this Dictionary, Fourcroy's Chemistry, vol I, Pearson on Elective Attractions, Kirwan on Mineral Waters, Kirwan on the Strength of Acids and the Composition of neutral Salts, Thomson's Chemistry, and the Supplement to the Encyclopedia Britannica, art Chemistry, part II chap vi

A'FFIONE A'FFION (*aphiun*, or *ophiun*, Arab) Opium

To AFFI'RM *v n* (*affirmo*, Lat) To declare, to tell confidently opposed to the word *deny*

To AFFI'RM *v a* To declare positively, to ratify or approve a former law or judgment

AFFI'RMABLE *a* (from *affirm*) That may be affirmed (*Hale*)

AFFI'RMANCE *s* (from *affirm*) Confirmation opposed to *repeal* (*Bacon*)

AFFI'RMANT *s* (from *affirm*) The person that affirms, a declarer

AFFIRMA'TION *s* (*affirmatio*, Lat) 1 The act of affirming or declaring opposed to *negation* (*Shakspeare*) 2 The position affirmed (*Hammond*) 3 Confirmation opposed to *repeal* (*Hooker*)

AFFIRMATION, in law, denotes an indulgence allowed to the people called Quakers who, in cases where an oath is required from others, may make a solemn affirmation that what they say is true, and if they make a false affirmation, they are subject to the penalties of perjury

AFFI'RMATIVE *a* (from *affirm*) 1 That does affirm opposed to *negative* 2. That can or may be affirmed (*Newton*) 3 Positive, dogmatical (*Taylor*)

AFFIRMATIVE, in grammar Authors distinguish affirmative participles, such as, yes —The term affirmative is sometimes also used substantively, as, " the affirmative is the more probable side of the question '—" there were so many votes, or voices, for the affirmative," &c

AFFIRMATIVE QUANTITY, one which is to be added, or taken effectively, or positively In algebra such quantities are denoted by the character +, which is, therefore, called the affirmative sign So + AB, + CD, are called affirmative quantities The sign which distinguishes them, is now likewise used to signify addition, as in + 6 + 9 + 5, which denotes the sum of 6, 9, and 5, i e 20 When the sum of several affirmative quantities is exhibited by means of the sign, it is usual to omit it before the first quantity, as in $a + b + c + d$, which denotes the sum of the positive quantities, a, b, c, and d

AFFI'RMATIVELY *ad* (from *affirmative*) On the opposite side, not negatively (*Brown*)

AFFI'RMER *s* (from *affirm*) The person that affirms (*Watts*).

To AFFI'X *v a* (*affigo*, *affixum*, Lat) 1 To unite to the end, to subjoin (*Rogers*) 2 To connect consequentially (*Hammond*)

AFFIX, in grammar, a participle added at the close of a word, either to diversify its form or alter its signification We meet with affixes in the Saxon, the German, and other northern languages, but more especially in the Hebrew, and other oriental tongues The Hebrew affixes are single syllables, frequently single letters subjoined to nouns and verbs, and contribute not a little to the brevity of that language

AFFI'XION *s* (from *affix*) 1 The act of affixing 2 The state of being affixed

AFFLA'TION *s* (*afflo*, *afflatum*, Lat) Act of breathing upon any thing

AFFLATUS literally denotes a blast of wind, breath, or vapour striking with force against another body The word is Latin, formed from *ad* *to*, and *flare*, *to blow* Naturalists sometimes speak of the afflatus of serpents Tully uses the word figuratively, for a divine inspiration, in which sense, he ascribes all great and eminent accomplishments to a divine afflatus

AFFLA'TUS (*ad* and *flo*, to blow) 1 A blast or vapour 2 A species of erysipelas

To AFFLI'CT *v a* (*afflicto*, *afflictum*, Lat) To put in pain, to grieve, to torment (*Hooker*)

AFFLI'CTEDNESS *s* (from *afflicted*) The state of affliction, or being afflicted, sorrowfulness, grief

AFFLI'CTER *s* (from *afflict*) The person that afflicts

AFFLI'CTION *s* (*afflictio*, Lat) 1 The cause of pain, or sorrow, calamity (*Hooker*). 2 The state of sorrowfulness, misery (*Addison*)

AFFLI'CTIVE *a* (from *afflict*) Painful, tormenting (*South*)

A'FFLUENCE, A'FFLUENCY *s* (*affluence*, Fr *affluentia*, Lat) 1 The act of flowing to any place, concourse (*Wotton*) 2 Exuberance of riches, plenty (*Rogers*)

A'FFLUENT *a* (*affluens*, Lat) 1 Flowing to any part (*Harvey*) 2 Abundant, exuberant, wealthy (*Prior*)

A'FFLUENTNESS *s* (from *affluent*) The quality of being affluent

A'FFLUX *s* (*affluxus*, Lat) 1 The act of flowing to some place, affluence 2 That which flows to any place (*Harvey*)

AFFLU'XION *s* (*affluxio*, Lat) 1 The act of flowing to a particular place 2 That which flows from one place to another (*Brc*)

To AFFO'RD *v a* (*affourrer*, *affourrager* Fr) 1 To yield or produce. 2 To grant, or confer any thing (*Brown*) 3 To be able to sell (*Addison*) 4 To be able to bear expences (*Swift*)

To AFFOREST. *v. a.* (*afforestare*, Lat.) To turn ground into forest (*Davies*)

To AFFRANCHISE. *v. a.* (*affranchir*, Fr.) To make free.

To AFFRAY. *v. a.* (*effrayer*, Fr.) To fright, to terrify: not in use (*Spenser*)

AFFRA'Y. *s.* A tumultuous assault of one or more persons upon others

AFFRICIA, a kind of wafers used in ancient sacrifices

AFFRI'CTION. *s.* (*affrictio*, Lat.) The act of rubbing one thing upon another (*Boyle*)

To AFFRI'GHT. *v. a.* (See FRIGHT.) To affect with fear; to terrify (*Waller*)

AFFRI'GHT. *s.* (from the verb.) 1. Terrour; fear (*Dryden*). 2. The cause of fear, a terrible object, dreadful appearance (*Ben Jonson*).

AFFRIGHTFUL. *a.* Full of affright or terrour, terrible, dreadful (*Decay of Piety*)

AFFRI'GHTMENT. *s.* (from *affright*.) 1. The impression of fear, terrour (*Locke*). 2. The state of fearfulness (*Hammond*)

AFFRODI'NA, or AFFRODI'TE (αφροδιτη.) Venus or Aphrodite, the chemical name of copper.

To AFFRO'NT. *v. a.* (*affronter*, Fr.) 1. To meet face to face, to encounter (*Shakspeare*). 2. To meet in a hostile manner, front to front (*Milton*). 3. To offer an open insult; to offend avowedly (*Dryden*)

AFFRO'NT. *s.* (from the verb.) 1. Open opposition; encounter (*Milton*). 2. Insult offered to the face, contumely (*Dryden*). 3. Outrage; act of contempt (*Milton*). 4. Disgrace, shame (*Arbuthnot*)

AFFRONTEE, in heraldry, an appellation given to animals facing one another on an escutcheon, a kind of bearing otherwise called *confrontée*, and stands opposed to *adossée*

AFFRONTER. *s.* (from *affront*.) The person that affronts

AFFRONTING. *particip. a.* (from *affront*.) That has the quality of affronting (*Watts*)

AFFUAGE, in ancient customs, a right of cutting fuel-wood in a forest

To AFFU'SE. *v. a.* (*affundo*, *affusum*, Lat.) To pour one thing upon another (*Boyle*)

AFFUSION, the act of pouring some fluid on another body. Divines and church historians speak of baptism by affusion, which amounts to much the same with what we now call sprinkling

To AFFY'. *v. a.* (*affier*, Fr.) To betroth in order to marriage (*Shakspeare*)

To AFFY. *v. n.* To put confidence in, to put trust in; to confide: not used

AFGHANS, are a people in India who inhabit a province of Cabul or Cabulistan, and have always been connected with the kingdoms of Persia and Hindostan. They boast of being descended from Saul the first king of Israel, of whose advancement to the royal dignity they give an account which deviates very widely from the truth. They say indeed that their great ancestor was raised from the rank of a shepherd, not from any princely qualities which he possessed, but because his stature was exactly equal to the length of a rod which the angel Gabriel had given to the prophet Samuel as the measure of the stature of him whom God had destined to fill the throne of Israel. Saul, whose descent, according to some of them, was of Judah, and according to others of Benjamin, had, they say, two sons, Berkia and Irmia, who served David, and were beloved by him. The sons of Berkia and Irmia were Afghan and Usbec, who during the reigns of David and Solomon distinguished themselves, the one for his corporeal strength, and the other for his learning. So great indeed was the strength of Afghan, that we are told it struck terror even into demons and genii. This hero used frequently to make excursions to the mountains, where his progeny, after his death, established themselves, lived in a state of independence, built forts, and exterminated infidels. When the select of creatures (the appellation which this people gave to Mahomet) appeared upon earth, his fame reached the Afghans, who sought him in multitudes under their leaders Khalid and Abdul Respid, sons of Walid, and the prophet honouring them with this reception "Come, O Muluc, or Kings!" they assumed the title of Melic, which they retain to this day. The history, from which this abstract is taken, gives a long and uninteresting detail of the exploits of the Afghans, and of their zeal in overthrowing the temples of idols. It boasts of the following monarchs of their race who have sat upon the throne of Delhi: sultan Behlole, Afghan Lodi, sultan Secander, sultan Ibrahim, Shir Shah, Islam Shah, Adil Shah Sur. It also numbers the following kings of Gaur descended from the Afghan chiefs: Solaiman Shah Garzani, Beyazid Shah, and Kutb Shah; besides whom, their nation, we are told, has produced many conquerors of provinces. The Afghans are sometimes called Solaimani, either because they were formerly the subjects of Solomon king of Israel, or because they inhabit the mountains of Solomon. They are likewise called Patans, a name derived from the Hindi verb Paitna, *to rush*, which was given to them by one of the sultans whom they served, in consequence of the alacrity with which they had attacked and conquered his enemies. The province which they occupy at present was formerly called Roh, and hence is derived the name of the Rohillas. The city which was established in it by the Afghans was called by them Pashwer or Paisher, and is now the name of the whole district. The sects of the Afghans are very numerous, of which the principal are, Lodi, Lohouni, Sur, Serwani, Yusufzihi, Bangish, Dilazaui, Khetti, Yasin, Khail, and Beloje. They are Musulmans, partly of the Sunni, and partly of the Shiah persuasion. Though they are great boasters, as we have seen, of the antiquity of their origin, and the reputation of their race, other Musulmans reject their claim, and consider them as of modern, and even base, extraction. This is probably a calumny, for it seems inconsistent

with their attention to the purity of their descent—an attention which would hardly be paid by a people not convinced of their own antiquity. They are divided into four classes. The first is the pure class, consisting of those whose fathers and mothers were Afghans. The second class consists of those whose fathers were Afghans, and mothers of another nation. The third class contains those whose mothers were Afghans, and fathers of another nation. The fourth class is composed of the children of women whose mothers were Afghans, and fathers and husbands of a different nation. Persons who do not belong to one of these classes are not called Afghans. Such is the account of the Afghans published in the second volume of the Asiatic Researches. It was translated from a Persian abridgment of a book written in the Pushto language, and called The Secrets of the Afghans, and communicated by Henry Vansittart, esq. to sir William Jones, then president of the Asiatic Society. Their claim to a descent from Saul king of Israel, whom they called Melic Talut, is probably of not a very ancient date: for the introduction of the angel Gabriel with his rod, gives to the whole story the air of one of those many fictions which Mahomet borrowed from the later rabbins. Sir William Jones, however, though he surely gave no credit to this fable, seems to have no doubt but the Afghans are descendants of Israel. "We learn (says he) from Esdras, that ten tribes, after a wandering journey, came to a country called Arsareth, where we may suppose they settled: now the Afghans are said by the best Persian historians to be descended from the Jews. They have traditions among themselves of such a descent, and it is even asserted, that their families are distinguished by the names of Jewish tribes, although, since their conversion to Islam, they studiously conceal their origin from all whom they admit not to their secrets. The Pushto language, of which I have seen a dictionary, has a manifest resemblance to the Chaldaic; and a considerable district under their dominion is called Hazareh, or Hazaret, which might easily have been changed into the word used by Esdras. I strongly recommend an enquiry into the literature and history of the Afghans." It is to co-operate with this accomplished scholar that we have inserted this short account of that singular people, and it is with pleasure that, upon the authority of Mr Vansittart, we can add, that a very particular account of the Afghans has been written by the late Hafiz Rahmat Khan, a chief of the Rohillahs, from which such of our readers as are oriental scholars may derive much curious information.

AFGHANISTAN, the country of the Afghans, stretching from the mountains of Tartary to the Arabian sea, and from the Indus to the confines of Persia.

AFFIELD. *ad.* (from *a* and *field*.) To the field (*Gay*).

AFION. See Affion.

AFLAT. *ad.* (from *a* and *flat*.) Level with the ground (*Bacon*).

AFLO'AT. *ad.* (from *a* and *float*.) Floating (*Addison*).

AFO'OT. *ad.* (from *a* and *foot*.) 1. On foot; not on horseback (*Shakspeare*). 2. In action, as, a design is afoot (*Shakspeare*). 3. In motion (*Shakspeare*).

AFO'RE. *prep.* (from *a* and *fore*.) 1. Before, nearer in place to any thing. 2. Sooner in time (*Shakspeare*).

Afo're. *ad.* 1. In time foregone or past (*Shakspeare*). 2. First in the way (*Shakspeare*). 3. In front, in the forepart (*Spens.*).

AFO'REGOING. *part. a.* (from *afore* and *going*.) Going before.

AFO'REHAND. *ad.* (from *afore* and *hand*.) 1. By a previous provision (*Gov. of Tongue*). 2. Provided, prepared, previously fitted (*Bacon*).

AFO'REMENTIONED. *a.* (from *afore* and *mentioned*.) Mentioned before (*Addison*).

AFO'RENAMED. *a.* Named before (*Peach*).

AFO'RESAID. *a.* Said before (*Bacon*).

AFO'RETIME. *ad.* In time past (*Susan.*).

AFRA'ID. *particip. a.* (from the verb *affray*.) Struck with fear, terrified, fearful (*Dryden*).

AFRE'SH. *ad.* (from *a* and *fresh*.) Anew, again (*Watts*).

AFRICA, one of the four grand divisions of the globe, lies south of Europe, and west of Asia. It is bounded on the north by the Mediterranean, which separates it from the former, and by the Red sea on the NE. which divides it from Asia, to which it is joined by the isthmus of Suez. Its greatest length from north to south is 4600 miles, and its greatest breadth from east to west is 3500 miles, reaching from lat. 37 N. to 35 S. and from lon. 17 W. to 50 E. The chief trade carried on by the Europeans, with the more savage African nations, is the purchasing or carrying off by force, whenever it is in their power, slaves for their colonies in other countries, and, because they have been remarkably successful in this iniquitous traffic, it has been asserted by interested men, that these barbarous nations are descended from Canaan, the son of Ham, whom Noah cursed, and prophesied that he should be a servant of servants of his brethren: and this is intended as a defence of their horrid system! a system which is now, to the eternal honour of the British, abolished among us. We do not yet know much of the interior parts of this vast region, and our little knowledge was much less previous to the information given us by Bruce, Vaillant, Park, and Brown. The principal rivers of Africa are, the Niger, the Senegal, the Gambia, the Laira, the Coanza, and the Nile: the principal mountains are the Atlas, the mountains of the Moon, and the Sierra Leona. Besides the animals that we have in Europe, Africa produces others not so generally known, as lions, leopards, tigers, panthers, rhinoceroses, elephants, came-

lions, ostriches, camels, dromedaries, monkeys, buffaloes, and wild asses in the rivers, there are crocodiles and river horses The most useful of these are the elephant, the camel, and the dromedary Africa has many islands, on the east are, Madagascar, St Maurice, Bourbon, and Zocotora On the west the isles of Madeira, the isles of Cape Verd, the Canary islands The isles of Madeira are, Madeira, Porto Santo, and La Deserta The Cape de Verd islands are, St Anthony, St Vincent, St Lucia, St Nicholas, St Jago, Sal, Mayo, Del Fuego, Brava, and Bonavista The Canary islands are, Lancerota, Forteventura, Canaria, Tenerif, Gomera, Ferro, and Palma There are other islands between this continent and South America, which are reckoned among the African islands, St Thomas, St Matthew, St Helena, Annobon, and Prince's isle

Africa, or Mehedita, a sea port town of Tunis, on the Barbary coast, in Africa Since the death of Mehedi, from whom this town received its latter name, it has often changed its masters, and been the occasion of much bloodshed Lat 35 36 N Lon 11 10 E.

African marigold See Tagetes

African ragwort See Othonna

African company, a society of merchants established by king Charles II for trading to Africa, which trade is now laid open to all his majesty's subjects, paying ten per cent for maintaining the forts

African association, was formed in 1788 with a view of promoting the discovery of the interior parts of Africa Mr Mungo Parke and others are now employed in this important work

AFRO'NT *ad* (from *a* and *front*) In front, in direct opposition to the face (*Shakspeare*)

AFSLAGERS, persons appointed by the burgomasters of Amsterdam to preside over the public sales made in that city, acting as brokers or auctioneers do with us

AFT, in the sea language, the same with abaft, i e behind, or near the stern of a ship

AFTER *prep* (æfter, Sax) 1 Following in place (*Shakspeare*) 2 In pursuit of (*Samuel*) 3 Behind (*Newton*) 4 Posterior in time (*Dryden*) 5 According to (*Bacon*) 6 In imitation of (*Addison*)

After *ad* 1 In succeeding time (*Bac*) 2 Following another (*Shakspeare*)

After is compounded with many words, but almost always in its genuine signification

AFTERAGES *s*, (from *after* and *ages*) Successive times; posterity (*Raleigh*)

AFTER ALL *ad* At last, in fine, in conclusion (*Atterbury*)

AFTERBIRTH *s* (from *after* and *birth*) The secundine (*Wiseman*)

AFTERCLAP *s* Unexpected event after an affair is supposed to be at an end (*Spenser*)

AFTERCOST *s* The expence incurred after the original plan is executed (*Mortimer*)

AFTERCROP *s*. Second harvest (*Mort*).

To AFTEREYE *v a* To follow in view (*Shakspeare*)

AFTERGAME *s* Methods taken after the first turn of affairs (*Wotton*).

AFTERMATH *s* (from *after* and *math*, from *mow*) Aftercrop The second crop of grass which springs up after mowing; or the grass cut after the corn In the neighbourhood of London, the aftermath, when made into hay, is of considerable value But in haying this crop, so as to render it wholesome for horses and cattle, great nicety is requisite, the nature of the aftermath being more soft and spongy than grass of the first growth See Hay and Husbandry

AFTERNOON *s* The time from the meridian to the evening (*Dryden*)

AFTERPAINS *s* Pains after birth

AFTERPART *s* The latter part (*Locke*)

AFTERPROOF *s* 1 Evidence posterior to the thing in question 2 Qualities known by subsequent experience

AFTERTASTE *s* Taste remaining upon the tongue after the draught

AFTERTHOUGHT *s* Reflections after the act, expedients formed too late (*Dryden*)

AFTERTIMES *s* Succeeding times (*Dryden*)

AFTERWARD *ad* In succeeding time (*Hooker*)

AFTERWIT *s* Contrivance of expedients after the occasion of using them is past (*L'Est*)

AFZELIA In botany, a genus of the class and order decandria monogynia; thus distinguished calyx tubular, with a four cleft border, deciduous, petals four, with claws, the uppermost very large, two uppermost filaments barren, legume many-celled, seeds arillate at the base The only known species is an African tree described by Dr F Smith, in the Transactions of the Linnean Society

AGA, in the Turkish language, signifies a great lord or commander Hence the aga of the Janissaries is the commander in chief of that corps, as the general of horse is denominated spahiclar aga The former is an officer of great importance We find also agas in other countries The chief officers under the khan of Tartary are so called, and among the Algerines we read of agas

Aga crete'nsium (from אגא, *wild*, Talm) The Spanish milk-thistle, a native of Crete

AGAGIER, a name given in Abyssinia to those whose business it is to hunt and kill elephants

AGA'IN *ad* (agen, Saxon) 1 A second time, once more (*Bacon*) 2 On the other hand (*Bacon*) 3 On another part (*Dryden*) 4 In return 5 Back; in restitution (*Shakspeare*) 6. In recompence (*Proverbs*). 7. In order of rank or succession (*Bacon*). 8. Beside, in any other time or place (*Bacon*) 9 Twice as much (*Pope*) 10 Again and again; with frequent repetition, often (*Locke*) 11 In opposition; by way of answer

again 12 Back, as, returning from some message

AGA'INST. *prep.* (ængeon, Saxon) 1 In opposition to any person all are against him (*Genesis*). 2. Contrarily to, in opposition to, it is against his will (*Dryden*). 3 In contradiction to any opinion tracts against popery (*Swift*) 4. With contrary motion or tendency, against the stream (*Shakspeare*) 5 Contrary to rule; against law (*Milton*) 6. Opposite to, in place against the river's mouth (*Dryden*) 7 To the hurt of another the accident is against me (*Davies*) 8 In expectation of provided against the time (*Dryden*).

AGALA'CTIA (αγαλακτια, from α priv and γαλα, *milk*) A defect of milk after child-birth

AGALA'CTOUS (αγαλακτος) Destitute of milk

AGA'LLACHI VERI LIGNUM See LIGNUM ALOES

AGALLO'CHIUM (αγαλλοχον) The aromatic aloe

AGALMATA, in antiquity, a term signifying ornaments in a temple, as statues, &c

AGAMEMNON, king of Mycenæ and Argos, was brother to Menelaus, and son of Plisthenes, the son of Atreus Homer calls them sons of Atreus, which is incorrect, upon the authority of Hesiod Apollod &c When Atreus was dead, his brother Thyestes seized the kingdom of Argos, and removed Agamemnon and Menelaus Agamemnon married Clytemnestra, and Menelaus Helen, both daughters of Tyndarus king of Sparta, who assisted them to recover their father's kingdom, where Agamemnon established himself, at Mycenæ Menelaus succeeded his father-in-law When Helen was stolen by Paris, Agamemnon was elected commander in chief of the Grecian forces going against Troy Their fleet was detained at Aulis, where Agamemnon sacrificed his daughter to appease Diana During the Trojan war, Agamemnon behaved with much valour, but his quarrel with Achilles, whose mistress he took by force, was fatal to the Greeks Clytemnestra, with her adulterer Ægisthus, prepared to murder him on his return, and as he came from the bath, to embarrass him, she gave him a tunic whose sleeves were sewed together, and while he attempted to put it on, she brought him to the ground with the stroke of a hatchet, and Ægisthus seconded her blows His death was revenged by his son Orestes

AGANIPPIDES, in ancient poetry, a designation given to the muses, from a fountain of mount Helicon, called Aganippe

AGANIPPE, in antiquity, a fountain of Bœotia at mount Helicon, on the borders between Phocis and Bœotia

AGAPANTHUS In botany, a genus of the class and order hexandria monogynia, with corol inferior, funnel form, six parted, regular. One only known species is a Cape plant.

AGA'PE *ad* (*a* and *gape.*) Staring with eagerness (*Spectator*).

A'GAPE (אהבה, *agabe*, Heb) 1 Desire 2 A delicious banquet

AGAPES, or AGAPÆ, in church history, a kind of religious festival, celebrated in the ancient church, to keep up a harmony and concord among its members The word is formed of the Greek αγαπη, *love* St. Chrysostom describes this feast thus Upon certain days, after partaking of the Lord's Supper, the Christians met at a common feast, the rich bringing provisions, and the poor, who had nothing, being invited, the ceremony ended with the kiss of charity During the three first centuries, these love-feasts were held in the church without scandal and offence, but, in after-times, the heathens began to tax them with impurity This led to some regulations and precautions and at length to their abolition at the council of Carthage, in the year 397 The Agapæ have been revived among some modern denominations of Christians, and with them have been restored the old calumnies

AGAPETÆ, in ecclesiastical history, a name given to certain virgins and widows, who, in the ancient church, associated themselves with, and attended on, ecclesiastics, out of a motive of piety and charity

A'GARIC, AGA'RICUM, AGARICUS In surgery (αγαρικον, from Αγαρια, a town in Asia, from which it was brought or from Agarus, a river in Sarmatia, now Malowonda) Agaricus chirurgorum agaricus quercus Agaric of the oak Touchwood boletus The boletus igniarius, acaulis, pulvinatus levis, poris tenuissimis of Linnéus A fungus formerly much used by surgeons as an external styptic but, in modern days, deservedly sunk into disesteem

AGARICUS ALBUS In medicine, the boletus laricis of the pharmacopeias The troches, extracts and pills made from it, were formerly considered valuable in pulmonary consumption

AGARICUS CHIRURGORUM See AGARIC

AGARICUS MUSCA'RIUS In medicine, the agaricus muscarius, stipitatus, lamellis dimidiatis solitariis, stipite volvato apice dilatato basi ovato of Linnéus A fungus employed by foreign surgeons externally, as an eschrotic in cases of strumous, phagedenic, or fistulous ulcers, but little used in England

AGA'RICUS, AGARIC In botany, a genus of the class and order cryptogamia fungi, generically distinguished by gills underneath, It is one of the most extensive plants in botany, naturalists having enumerated upwards of three hundred species of it already, and probably there are many that have not yet been noticed They may be divided into those, 1 With stem surrounded with a ring and curtain 2 Stem with a curtain without a ring 3 Stem ranged or annulate without wrapper 4 Stem without ring or wrapper 5 Cap funnel form or oblique 6 Cap halved, stem

lateral 7 Smooth, membranous, or fleshy, cap and gills coriaceous 8 Smooth, tender, mostly pellucid, with the cap striate and plaited, generally of an uniform colour 9 Tender; more or less transparent, partly dissolving into a black fluid, or furnished with black gills. 10 Cap opake, conic, gills sooty when old, and dissolving into a black sanies, stem hollow 11 Stemless Of these the common mushroom is the a campestris, and belongs to 3 in the above arrangement

AGARIC MINERAL (See CRETA,) of which it forms the species named c squamosa

AGAST a (from agaze) Struck with terror, staring with amazement (*Milton*)

AGASYLLIS, (αγασυλλις, from αγαζομαι *to be wonderful*,) the name given by Dioscorides to the gum-ammoniac tree, from its supposed good qualities

AGATHA, (αγαθος, *good*,) a name of the achates or agate

AGATE See ACHATES

AGATHODÆMON, in mythology, a beneficent genius or dæmon

AGATHOPHYLLUM In botany, a genus of the class and order dodecandria monogynia, thus distinguished Calyx very minute truncate, petals six, inserted into the calyx drupe somewhat globular, nut half-five celled, one-seeded, kernel five lobed The only known species is a native tree of Madagascar

AGAVE American aloe A genus of the class and order hexandria monogynia, with corol erect, superior, calyxless, filaments erect, longer than the corol There are seven species of this magnificent plant, all which are common to North or South America One or two of the species are also found in the hedges of Spain and Portugal

AGE s (*age*, Fr) 1 Any period of time attributed to something, as the whole, or part of its duration (*Shakspeare*) 2 A succession or generation of men (*Roscommon*) 3 The time in which any particular man, or race of men lived (*Pope*) 4 The space of a hundred years, a century 5 The latter part of life, oldness (*Prior*) 6 Maturity ripeness, full strength of life (*Dryden*) 7 (In law) In a man, the age of fourteen years, is the age of discretion, and twenty-one years is the full age A woman at twenty-one is able to alienate her lands (*Cowell*) By the Roman law different ages were ascertained for different purposes Thus the consular age, or that at which a person might hold the consulship, was the forty-third year The judiciary age, between the thirty and sixtieth year The military age, seventeen years The prætorian age, forty years The legitimate age, twenty-five year

AGE Among ancient physiologists the life or age of man was divided into six stages, pueritia or childhood extending from birth to the year fifteen, adolescentia, or boyhood, to the year eighteen; juventus, or youth, to the year thirty virilis ætas, manhood, to fifty senectus, old age, to sixty crepita ætas, decrepitude, to death

Age of a Horse, may be judged of by several particulars, but the chief characters by which it is determined are found in the teeth, which are forty in number, namely, six great teeth both above and below, on each side called back-teeth, or grinders, six above and as many below in the front of his mouth, called fore-teeth, or gatherers, and four tusks, or tushes named bitt teeth, which make just forty, but mares being in general without tusks, their teeth are but thirty-six in number A colt is foaled without teeth, but in a few days he puts out four which are called pincers or nippers, soon after, the four separaters appear next to the pincers after which it is frequently three or four months before the next, called corner teeth, push forth These twelve colt's teeth in the front of the mouth continue without alteration, till the colt arrives at the age of two years or two years and a half, which circumstance renders it very difficult to avoid being imposed upon during that time, if the seller of the colt find it his interest to make the colt appear older or younger than he is in reality In this case you may judge with more certainty of his age by his coat, and the hair of his mane and tail, than by his teeth, for a colt of a year old has a rough supple coat, like that of a water spaniel, and the hair of his mane and tail feels like flax, whereas a colt of two years has a flat coat, and straight hair like an aged horse At about two years and a half, or three years of age, a horse begins to shed or change his teeth Those called the pincers, as they first made their appearance, are the first that fall out, so that when he rises three years, he has four horse's and eight colt's teeth, which are easily distinguished, the former being larger, flatter, and of a yellower colour than the other, and streaked from the end quite down into the gum Further, these four horse's teeth, or pincers, have in the middle of their extremities a deep black hole or mark, whereas those of the colt are round and white When the horse comes nearly four years old, he loses his four separaters, or middle teeth, and in room of them puts out four others, which follow the same rule as the former ones, called the pincers At five years old he changes the four corner, which are the last of his colt's teeth, and is afterwards called a horse During this his fifth year his four tusks make their appearance behind the others, and the lower ones frequently push forth, three or four months before the upper But whatever some may assert to the contrary, a horse that has the two lower tusks without the upper beginning to make their appearance may be judged under five years of age, unless the other teeth shew to the contrary, for some horses never put forth any upper tusks at all, though this is not very frequently the case The two lower tusks are one of the most certain signs that a horse is coming five years old, though his colt's teeth may not be all gone at the same time. However unfair, it is no unfrequent thing for breeders and dealers in horses to pull out their last colt's teeth, in order to make them appear five, when they are in reality only four years old; but if

all the colt's teeth are gone, and there is no appearance of the lower tusks, you may be pretty sure that this trick has been played, though they sometimes make use of another artifice, to mislead your judgment, which is to beat the bars every day with a wooden mallet, in the place where the tusks are to appear, in order to make them seem hard, and as if the tusks were already nearly cut through. When a horse is full six years old, the two lower pincers fill up, and instead of the above-mentioned holes, only a black spot remains visible: betwixt six and seven the two middle teeth fill up in the same manner, and between seven and eight the corner teeth do the like, after which it is very difficult, if not impossible, to tell the exact age of a horse, though a good judge will seldom err a great deal notwithstanding a horse has no mark in his mouth. For the purpose of judging of a horse's age, by the teeth, after he has lost the mark, we must have recourse to the tusks and the situation of the teeth. In examining the tusks you must feel the inside of them with your finger, from the extremity quite down to the gum, and if they are pointed, flat, and have two small channels withinside, you may be certain that the horse is not more than nine or ten years old at most: between eleven and twelve, the two channels are reduced to a single one, which, after twelve, is entirely obliterated, and the tusks feel as round withinside as they appear without. After this, there remains no other sign whereby to discover the horse's age by but the situation of the teeth. And here it is to be noted, that the longest teeth are not always a sign of the greatest age. For if they hang or push forward, though but of a moderate length, the animal is certainly very old; but if they meet perpendicularly, let their length be never so great, it is an infallible sign that the horse is still young enough to perform a great deal of service. It will perhaps be needless to mention the tricks that are made use of in order to impress a false mark in a horse's mouth, by hollowing his teeth with a graver, and then burning a mark with a small hot iron (which is called bishoping): because those that are acquainted with the true mark will easily detect the cheat, by several other circumstances, such as the size and colour of the teeth, the length, roundness, and bluntness of the tusks, the colour of the false mark, which is considerably blacker than the true one, and deeper, and by several other visible tokens, which denote that a horse is far advanced in years. When the mark is gone, recourse may be had to the horse's legs, observing whether they be neat and good: to his flank, whether it be well trussed, not too full or swallowed up; and likewise to his feet, and appetite, all of which will help to confirm the buyer in his judgment, and prevent his being imposed upon in respect to the age of any horse he may wish to purchase. In addition to the foregoing remarks, the following may not be altogether useless. The bars in a young horse's mouth are always fleshy, and form so many distinct ridges, whereas in an old horse they are lean, dry, and smooth, with little or no rising. The eye-pits in a young horse are generally well filled up with flesh, and look plump and smooth, but in an aged horse, quite the reverse is found to be the case; they appear sunk, and hollow, and make him look ghastly, and of a melancholy aspect. Grey horses, when very old, frequently turn white; black ones are apt to grow grey over their eye brows, and sometimes all over their faces. All horses when very old sink more or less in their backs, and such as are naturally long or low backed grow so hollow with age, as to render it very difficult to fit them with a saddle. Many of the Spanish and Barbary horses, with some of the Flanders and Danish breed, come under this description. The joints of aged horses likewise grow so stiff, and their knees and hocks bend so much, that they are almost incapable of going down the smallest declivity without stumbling, notwithstanding the road is by no means rough or unpleasant; when once this comes to be the case with a horse, whatever merit he may have had formerly, he can be of but little service to his owner in future.

Age of a hunting or race Horse, should be five years before you train him in; for however common a custom it may be among sportsmen to hunt their horses at four years old, or sooner, it is a very blameable one, since at that age a horse's joints are not full knit, nor is he come to his best strength or courage, the consequence of which is, that he is almost sure to be disabled from performing any matter of speed or toughness; beside the hazard which he runs in being put so young to severe labour, and meeting with strains, and putting out splents, spavins, curbs, and wind-galls. How often moreover do we see horses that have been thus injudiciously used, lose all their natural fire and spirit, and become melancholy, stiff, and rheumatic: having all the distempers of old age entailed upon them before they are arrived at their prime.

Age of neat Cattle. The age of the ox, cow, and bull, is known by the teeth and horns. At the end of ten months they shed their first fore teeth, which are replaced by others, larger, but not so white, and in three years all the incisor teeth are renewed. These teeth are at first equal, long, and whitish; but as the animal advances in years they wear, become unequal and black. They also shed their horns at the end of three years, and these again are replaced by other horns, which like the second teeth continue till old age. The manner of the growth of these horns is not uniform, nor their pullulations equal. In the first year of their appearance, that is in the fourth of the animal's age, two small pointed horns make their appearance, neatly formed, smooth, and towards the head terminating by a kind of button. The following year this button moves from the head, being impelled by a horny cylinder, which, lengthening in the same manner, is also terminated by another button, and so on: for the horns continue to grow during

the life of the animal These buttons become annular joints, which are easily distinguished in the horn, and by which the age may be easily ascertained, reckoning three years for the point of the horn, and one for each of the joints

Age of Sheep Sheep in their second year have two broad teeth, in their third year four broad teeth before, in their fourth year six broad teeth, and in their fifth year eight broad teeth After which the age of the sheep is uncertain till the teeth are either cast or worn down, both which are common signs of considerable age At the end of one year, rams, sheep, and wethers, lose the two fore-teeth of the lower jaw, and are known to want the incisor teeth in the upper jaw, at eighteen months the two teeth adjoining the former also fall out, and at three years being all replaced, they are even and pretty white But with advancing age they become loose, blunt, and at length black The age of the ram, and of all horned sheep, may also be known by their horns, which shew themselves in their very first year and often at birth, and continue to lengthen by the addition of a ring, annually, to the latest period of life

Age of Goats This is ascertained by the same rules that apply to sheep, in regard to their teeth and horns

Age of the Moon, the number of days elapsed since the last conjunction, or new moon See MOON

AGED *a* (from *age*) 1 Old, stricken in years (*Prior*) 2 Old applied to inanimate things (*Still*)

A'GEDLY *ad* (from *aged*) After the manner of an aged person

AGEM, (אגם agam, a lake Hebrew,) a name of the Persian lilac, so called because it grows about ponds and lakes

AGEMA, in Macedonian antiquity, was a body of soldiers, not unlike the Roman legion

AGEMOGLANS, AGIAMOGLANS, or AZAMOGLANDS, in the Turkish polity, are children purchased from the Tartars, or raised for the purposes of war every third year, by way of tribute, from the Christians, tolerated in the Turkish empire

AGEN *ad* (agen, Sax) Again, in return, in recompence (*Dryden*)

A'GENCY *s* (from *agent*) 1 The quality of acting, the state of being in action action (*Woodward*) 2 Business performed by an agent (*Swift*)

AGENDA, with philosophers and divines, signifies the duties a man lies under an obligation to perform we meet with this in opposition to the credenda, or things he is to believe

AGENDA, among merchants, a term sometimes used for a memorandum-book, in which is set down all the business to be transacted during the day, either at home or abroad

AGENDA, among ecclesiastical writers, denotes the service or office of the church

AGENE'SIA, (αγενησια, from α neg and γεννάω, *to procreate*) Venereal impotency, inability to beget children A term employed in Vogel's nosology, and correspondent with Cullen's anaphrodisia, and dyspermatismus

AGENFRIDA, in ancient customs, denotes own lord, or one who has the absolute property and dominion of a thing

AGENHINE, in our old writers, signifies a guest that has lodged at an inn for three nights, after which time he was accounted one of the family, and his host was responsible for his behaviour

AGENOIS, in geography, a country of France, in the late province of Guienne, and present department of the Lot and Garonne, comprehending about 120 square leagues

AGENT *a* (*agens*, Lat) That does act (*Bacon*)

AGENT *s* 1 An actor, he that acts (*South*) 2 A substitute, a deputy, a factor (*Dryden*) 3 That which has the power of operating, or producing effects on another thing In this sense, agents are either natural or moral Natural agents are such inanimate substances as have a power communicated to them by the author of nature to produce one sort of effect, while moral agents are rational creatures capable of performing several effects, or several kinds of actions, and of regulating those actions in conformity with a certain rule

AGENT, in chemistry, signifies any substance capable of producing chemical action, or whose presence determines the combination or decomposition

AGENT AND PATIENT, in law, a person who is at once the doer of a thing, and the party to whom it is done Thus when a man who is indebted to another makes his creditor his executor, and dies, the executor may retain so much of the goods of the deceased as will satisfy his debt, by which means he becomes agent and patient that is, the person who both pays and receives the debt

AGENTES IN REBUS, one of the ranks of officers, in the court of the Constantinopolitan emperors, whose business was, to collect and convey the corn both for the army and household, carry letters and messages from court to all parts of the empire, regulate couriers, to make frequent journeys through the provinces, inspect any motions, disturbances, machinations, &c and give early notice thereof to the emperor

AGER, in Roman antiquity, a certain portion of ground allowed to each citizen

AGER is also used, in middle-age writers, for what we now call acre

AGER, (from αγρος, *wild*, uncultivated,) the soil or common earth

AGER CHYMICUS, the ground of chemistry, a term used by chemists to denote water,

AGER MINERALIUM, the same as ager chymicus, and for the same reason water being equally the ground or basis of minerals

AGER NATURÆ, the ground or field of nature A term applied to the uterus or womb

AGERA'SIA, (αγηρασια, from α priv. and γηρας, *old age*) Green, or immature old age.

AGERATUM, in pharmacy (*αγηρατον*, from *α* priv and *γηρας*, *old age*, i e never old, or ever green.) Balsamita fem Eupatorium Mesues The herb sweet-maudlin, so called because its flowers preserve their beauty a long time The ageratum of the pharmacopœias is the achillea ageratum foliis lanceolatis, obtusis, acute serratis of Linnæus It was formerly employed in hepatic or bilious cases

AGERA'TUM. In botany, a genus of the class and order syngenesia, polygamia æqualis Receptacle naked, seeds crowned with five chaffs, more or less awned, calyx oblong, and a double row of leaflets, florets four or five-cleft There are three species, one a native of South America, the other two of India

AGERATUS LAPIS, (ageratus common or belonging to a field) The lapstone used by coblers It was formerly employed in medicine as a powder gently astringent

A'GES, (from *αγης*, *mischievous*) The palm or hollow of the hand, from its power of injuring

AGES OF THE WORLD Greek historians divided the time elapsed since the beginning of the world into three ages 1 From the creation to the deluge, which they called the obscure or uncertain age, because the history of mankind is uncertain during that period 2 The fabulous or heroic age, because of the fabulous exploits of their gods and heroes It began with the Ogygian deluge, and continued to the first Olympiad, where the third or historical age commenced —This division, however, it must be observed, holds good only with regard to the Greeks and Romans, who had no histories earlier than the first Olympiad the Jews, Egyptians, Phœnicians, and Chaldees, not to mention the Indians and Chinese, who pretend to much higher antiquity, are not included in it By the poets, however, the interval since the first formation of man has been divided into four ages, distinguished by the epithets of golden, silver brazen and iron according to the progressive increase of vice and depravity in the world, and the consequent decrease of happiness among mankind In some ancient northern monuments, the rocky or stony age correspond to the brazen age of the Greeks, and the northern poets style the fourth age of the world the ashen age Among the Jews, the duration of the world is also divided into three ages 1 The seculum inane, or void age, was the space of time from the creation to Moses 2 The present age, denotes all the space of time from Moses to the coming of the Messiah, and, 3 The age to come, denotes the time from the coming of the Messiah to the end of the world By some, the space of time commencing from Constantine, and ending with the taking of Constantinople by the Turks in the fifteenth century, is called the middle age but others date it from the division of the empire made by Theodosius at the close of the fourth century, and extend it to the time of the emperor Maximilian I. in the beginning of the sixteenth century, when the empire was first divided into circles —The middle is by some denoted the barbarous age, and the latter part of it the lowest age The several ages of the world may be reduced to three grand epochas, viz the age of the law of nature, called by the Jews the void age, from Adam to Moses, the age of the Jewish law, from Moses to Christ, and the age of Grace, from Christ to the present time

AGESILAUS, king of Sparta, of the family of the Agidæ was son of Doryssus, and father of Archelaus During his reign, Lycurgus instituted his famous laws —Son of Archidamus of the family of the Proclidæ, in preference to his nephew Leotychides He made war against Artaxerxes king of Persia with success but in the midst of his conquests in Asia, he was recalled home to oppose the Athenians and Bœotians, who desolated his country He defeated his enemies at Coronea, but sickness prevented the progress of his conquests, and the Spartans were beat in every engagement, especially at Leuctra, till he again appeared at their head Though deformed small of stature, and lame he was brave, and a greatness of soul compensated all the imperfections of nature When he went, in his eightieth year, to assist Tachus king of Egypt, the servants of the monarch could hardly be persuaded that the Lacedemonian general was eating with his soldiers on the ground, bare headed, and without any covering underneath Agesilaus died on his return from Egypt, after a reign of thirty six years, 362 B C and his remains were embalmed and brought to Lacedæmon

AGEUSTIA (*αγευστια*, from *α* neg and *γευω*, *to taste*) A defect in the sense of taste A genus of diseases ranged by Cullen class locales order dysæsthesiæ

AGGADIL in Jewish antiquity, an ingenious tale or story, of which kind there are many in the Talmud

AGGENERATION s (from *ad* and *generatio*, Lat) The state of growing or uniting to another body (*Brown*)

AGGER, in ancient Latin writers, denotes the middle part of a military road, raised into a ridge, with a gentle slope on either side to make a drain for the water, and keep the way dry

AGGER is also used for the whole road, or military way

To AGGERATE v a (from *aggero*, Lat) To heap up

AGGERHUUS, or CHRISTIANA, the largest diocese in the southern parts of Norway, and the principal and most considerable in the whole kingdom, being 300 miles long, and 120 miles broad

AGGERHUUS, a considerable mountain fortress in the diocese of Aggerhuus It is uncertain when this fortress was erected in 1310 it was besieged by duke Erich of Sweden, but without success in 1567, the Swedish army besieged it for 18 weeks in vain, and in 1717, a fruitless attempt was again made upon it by

the Swedes under Charles XII It is 30 miles N W of Frederickshall Lat 59 25 N Lon 10 20 E

To AGGLO'MERATE *v a* (*agglomero*, Lat) To gather up in a ball, as thread

AGGLUTINA'NTIA Agglu'tinants (*agglutino*, to glue together) Applications medical or chirurgical that produce adhesion of parts to parts

To AGGLU'TINATE *v n* (from *ad* and *gluten*, Lat) To unite one part to another (*Harvey*)

AGGLUTINATION *s* (from *agglutinate*) Union cohesion (*Wiseman*)

AGGLUTINATIVE *a* (from *agglutinate*) That has the power of procuring agglutination (*Wiseman*)

To AGGRANDIZE *v a* (*aggrandiser*, Fr) To make great, to enlarge to exalt (*Watts*)

A'GGRANDIZEMENT *s* (*aggrandissement*, Fr) The state of being aggrandized

A'GGRANDIZER *s* (from *aggrandize*) The person that makes great another

To AGGRATE *v a* (*aggratare*, Ital) To please, to treat with civilities not in use (*Spenser*)

To AGGRAVATE *v a* (*aggravo*, Lat) 1 To make heavy, in a metaphorical sense as to aggravate an accusation (*Milton*) 2 To make any thing worse (*Bacon*)

AGGRAVATION *s* (from *aggravate*) 1 The act of aggravating 2 The act of enlarging to enormity (*Addis*) 3 The extrinsical circumstances, which increase guilt or misery (*Hammond*)

A'GGREGATE *a* (*aggregatus* Lat) Framed by the collection of particular parts into one mass, body, or system (*Ray*)

Aggregate *s* The result of the conjunction of many particulars (*Glanville*)

Aggregate, in general denotes a body formed by the union of others of the same kind which are smaller, the whole sum of which combined is called the aggregate The minutest parts into which an aggregate can be imagined to be divided without decomposition, are called integrant particles, but the parts into which it is divided by decomposition, are called component parts or principles See Aggregation

Aggregate flower (*aggregatus flos*, from *aggregare* to assemble or collect together) That which has some part of the fructification common to several florets Or, when several florets are so combined by the intervention of some part of the fructification, that taking away one of them destroys the uniformity of the whole This common bond is either the receptacle or the calyx The partial or component flower of the aggregate is called a floscule or floret There are seven kinds of aggregate flowers 1 Umbellate or umbelled 2 Cymose or cymed 3 Compound 4 Aggregate properly so called, having a dilated receptacle, and the florets on peduncles as scabiosa, knautia, teasel, cephalanthus, globularia, [illegible]dendron protea, statice, &c 5 Amentaceous 6 Glumose, as the grasses. Spadiceous, as the palms, also calla, dracontium, pothos, arum, zostera Hence aggregatæ is the name of the forty-eighth order of plants, in Linnéus's Fragments of a Natural Arrangement, in Philos Bot containing such vegetables as have their flowers properly aggregate

Aggre'gate glands (*glandulæ aggregatæ*) An assemblage of glands lodged in the cellular coats of the intestines

To Aggregate *v a* (*aggrego*, Lat) To collect together, to accumulate, to heap many particulars into one mass (*Milton*)

AGGREGA'TION *s* (from *aggregate*) 1 Collection, or state of being collected (*Brown*) 2 The collection, or act of collecting many particulars into one whole (*Woodward*) 3 The whole composed by the coacervation of many particulars, an aggregate

Aggregation, in chemistry, denotes the cohesion of parts of the same kind In order to have a clear idea of this term, and those relating to it we must attend to the difference between the constituent and the integrant parts of bodies The constituent parts are, properly speaking, the principles of bodies these are substances differing in nature from each other, which, by their union and mutual combination really constitute mixed bodies, which partake of the properties of their constituent parts For example, the constituent parts of common salt are an acid and an alkali, which ought to be considered as the principles of this salt at least as its proximate principles (See Principles) As this acid and alkali are what really constitute common salt and are the parts, to the union of which it owes its existence and properties it is evident that the constituent parts cannot be disunited from each other, without destroying and decomposing it so that after such a disunion, the salt will no longer exist but only the acid and the alkali of the salt, which are very different from the salt, and from each other On the contrary the integrant parts of bodies do not absolutely differ from each other nor do they differ, as to the nature and principles, from the body into whose mass they enter By the integrant parts of a body are to be understood the smallest molecules or particles into which this body can be reduced without decomposition We may conceive that a neutral salt, for instance common salt, may be divided into molecules still smaller and smaller, without any separation of the acid and alkali which constitute the salt, so that these molecules, however small, shall always be common salt, and possessed of all its essential properties In the same manner that we conceive that a body may be divided into its primary integrant molecules, without any change of its nature, or other alteration than a diminution of its bulk, so we may also easily perceive, that if these primary integrant molecules, which are all homogeneous and of the same nature, and which are supposed separated from each other, should

be brought to unite and combine together, no new body, that is, a body of different nature, will result from this union, but only a more considerable mass of the same body that is to say, for instance, that if the primary integrant molecules were common salt, their reunion would still form common salt, only in a mass so much larger, as there is a greater number of these molecules united together But it is the union of these homogeneous parts of these primitive integrant molecules, which modern chemists have called aggregation, and they have called aggregates, bodies considered as resulting from their primary integrant parts, in opposition to the names mixt and compounds, which they have given to bodies considered as resulting from the union of their constituent parts, which are substances heterogeneous, and of different natures The name of integrant parts, which has been given to those whose union forms aggregates agrees well with them, because, in fact, this union is a kind of addition or integration (if such a word may be used) of a certain number of parts of the same kind, whence results a sum, or a whole It is very essential to observe on the subject of aggregation, that we should have a very false idea of it, and entirely opposite to chemical phenomena, if we understood by this word nothing but a simple juxtaposition of the integrant parts of bodies for besides that, there must be a real adhesion and intimate union of these same parts with each other, so that they cannot be separated but by some force superior to that by which they are united A heap of sand for example, if we consider the grains of sand as its integrant parts cannot be regarded as an aggregate, because these grains are only juxtaposited, and have no real adhesion together, so that the resistance which they oppose to their separation can only proceed from their gravity and is not the effect of adhesion or tendency to each other In the second place it is necessary to observe on the subject of aggregation, that the force of adhesion of the integrant parts of different bodies varies much according to the nature of these bodies, some of them adhering very strongly and others very weakly, and that those which adhere weakly are generally the easiest to be dissolved, considering that the solution of a body, or its combination with another body of a different nature, cannot be effected but so far as the integrant parts of these bodies are separated, or their aggregation is broken, which is partly done by the operations of art, but chiefly by the action of menstruums Macquer's Chem Dict

To AGGRESS *v a* (*aggredior, aggressum,* Lat) To commit the first act of violence (*Prior*)

AGGRESSION *s* (*aggressio,* Lat) The first act of injury, commencement of a quarrel by some act of iniquity (*L'Estrange*)

AGGRESSOR *s* (from *aggress*) The person that first commences hostility, the assaulter or invader (*Pope*)

AGGRIEVANCE *s* Injury, wrong endured.

To AGGRIEVE *v a* (from *gravis,* Lat) 1 To give sorrow, to vex (*Spenser*) 2 To harass, to hurt in one's right (*Grant*)

To AGGROUP *v a* (*aggropare,* Italian) To bring together into one figure (*Dryden*)

AGHAST *a* (from *a* and *gast, a ghost*) Struck with horrour, as at the sight of a spectre, stupified with terrour (*Addison*)

AGHEUSTIA See Ageustia

AGIASMA, among ancient writers, signifies the whole church, and sometimes the more sacred part

AGILD, or Agilde, in old law books denotes a person of so little account, that whoever killed him was liable to no fine for so doing

AGILE *a* (*agilis,* Lat) Nimble, ready, active (*Prior*)

AGILENESS *s* (from *agile*) Nimbleness, readiness for motion, quickness, activity

AGILITY *s* (*agilitas,* Lat) Nimbleness, quickness, activity (*Watts*)

AGILLARIUS, in ancient law books, a keeper of a herd of cattle in a common field

AGIMERE, a country of Hindostan, bounded on the east by Agra, on the north by Delhi, on the south by Guzerat, and on the west by deserts which lie between it and the Indus Its chief city, Agimere, is surrounded by high mountains, and lies in lat 26 24 N lon 75 20 E

AGINCOURT, or Azincour, a village of France, in the department of the straits of Calais The name will be ever memorable to an English ear on account of the complete victory which our Henry V gained there, with an army of 20,000 men, over an army of 60 000 Frenchmen The battle was fought Oct 25 1415

AGIO in commerce, a term chiefly used in Holland and at Venice where it denotes the difference between the value of bank stock and the current coin Money in bank is commonly worth more than specie thus, at Amsterdam, they formerly before the barbarous French invasion, gave 103 or 104 florins for every 100 florins in bank At Venice, the agio was fixed at 20 per cent The agio of the bank at Hamburgh is about 14 per cent , which is the supposed difference between the good standard money of the state, and the clipt worn, and diminished currency poured into it from neighbouring states

AGIOSYMANDRUM, a wooden instrument used by the Greek and other churches, under the dominion of the Turks to call together assemblies of the people The word is compounded of αγιος, *holy,* and σημαινω, *I signify*

To AGIST *v a* (*giste,* Fr a bed) To take in and feed the cattle of other men at a certain rate (*Blount*)

AGISTMENT, or Agistation, in law, signifies the taking in other people's cattle to graze it so much per week The term is peculiarly used for taking cattle to feed in the king's forests, as well as for the profits arising from that practice

AGISTMENT, is likewise used in a metaphorical sense to signify any tax, burden, or charge. Thus the tax levied for repairing the banks of Romney marsh was called *agistamentum*.

AGISTOR, or AGISTATOR, an officer belonging to forests, who has the care of the cattle taken in to be grazed, and who levies the monies due on that account. They are generally called guest-takers, or gist-takers, and are created by letters patent. Each royal forest has four agistors.

A'GITABLE. *a.* (*agitabilis*, Lat.) That may be put in motion.

To A'GITATE. *v. a.* (*agito*, Lat.) 1. To put in motion, to shake. 2. To actuate, to move (*Blackmore*). 3. To affect with perturbation. 4. To stir, to discuss, to controvert (*Boyle*). 5. To contrive, to revolve (*King Charles*).

AGITATION. *s.* (*agitatio*, Lat.) 1. The act of moving any thing (*Bacon*). 2. The state of being moved. 3. Discussion, controversial examination. 4. Perturbation, disturbance of the thoughts; violent motion of the mind (*Tatler*). 5. Deliberation, contrivance, the state of being consulted upon (*Swift*).

AGITATION, among philosophers, is chiefly used to denote an intestine commotion of the parts of any natural body. In this sense fire is said to agitate the minute particles of bodies; fermentation and effervescence are also attended with a brisk agitation of the particles.

AGITATOR. *s.* (from *agitate*.) He that agitates any thing; he who manages affairs.

AGITATOR, in antiquity, a term used for a charioteer, especially one who drove in the circus at the curule games.

AGITATORS, in the English history, certain officers set up by the army in 1647, to take care of its interests.—Cromwell, after having joined the agitators, got them abolished.

AGLAIA, the name of the youngest of the three Graces, espoused to Vulcan.

AGLAUS, the poorest man of Arcadia, pronounced by the oracle more happy than Gyges king of Lydia. Plin.

A'GLET. *s.* (*aiguilette*, Fr.) 1. A tag of a point carved into some representation of an animal (*Hanmer. Shaksp.*). 2. The pendants at the ends of the chives of flowers, as in tulips.

AGLIDIA, or AGLI'THES (ἀγλίδια, αγλιθη, from *αγλιομαι, to be offensive*.) The cloves, or heads of garlic, so called from their disagreeable smell.

AGLUTITION (*aglutitio*, from *α* neg. and *γλυζω, to swallow*.) Difficulty of swallowing, or deglutition.

AGMEN, in antiquity, properly denotes a Roman army in march; in which sense it stands contradistinguished from *acies*, which denoted the army in battle array; though, on some occasions, we find the two words used indifferently for each other.

AGMINAL. *a.* (from *agmen*, Lat.) Belonging to a troop.

AGMONDESHAM. See AMERSHAM.

AGNAIL. *s.* (from *anze*, *grieved*, and *nagle*, *a nail*.) A disease of the nails, a whitlow.

AGNANTHUS, of Vaillant. See CORNUTIA.

AGNATI, in the Roman law, the male descendants from the same father.

AGNATION, in the civil law, the kinship, or relation, between the descendants of the same father, being males, and issued only from males. The word is formed from *ad*, to, and *nasci*, to be born. Agnation differs from cognation, as the latter is a universal name, under which the whole family, and even the agnati themselves, are contained; and agnation, a particular branch of cognation, which only includes the descendants in the male line. Again, agnation is properly only a civil name, as that of gens, or family; cognation, a natural name, or derived from blood.

AGNEL, an ancient French gold coin, worth about 12 sols, 6 deniers.

AGNELET, an old French silver coin, worth about 20 sols.

AGNESI (Maria Gaetana), an Italian lady, of very remarkable talents, and singularly extensive acquirements. We have not been able to procure accurate information as to the time of the birth and death of this celebrated female; but the particulars within our reach are so curious as to demand their insertion here. Donna Agnesi was the daughter of a creditable tradesman in Milan: we know not in what way she received her education, or whether the natural strength of her mind was much assisted by any great advantages derived from instructors: we find her, however, as early as her 18th or 20th year, much noted on account of her varied and profound attainments. She was universally spoken of as a kind of literary phenomenon, and obtained, not by way of sneer, but of commendation, the appellation of the Walking Polyglot: she had acquired a prodigious knowledge, not merely of the modern languages of Europe, but of the learned and of the oriental languages: besides this, she had obtained an intimate acquaintance with the mathematical and philosophical sciences. While very young she composed a profound treatise of algebra, entitled Analytical Institutions, which, besides many eulogiums bestowed on her by several learned societies, gained her a professorship of mathematics in the university of Bologna. M. Montucla, speaking of this work, expresses himself thus: "We cannot behold without the greatest astonishment a person of a sex that seems so little fitted to tread the thorny paths of these abstract sciences, penetrate so deeply as she has done into all the branches of algebra, both the common and transcendental, or infinitesimal." These Institutions were published in 1748, and were so much esteemed that Mr. Professor Colson (the translator of sir Isaac Newton's Fluxions), was at the pains of learning the Italian language that he might be able to translate Agnesi's work. His translation remained unpublished till 1801, when it was given to the public by the rev. John Hellins, F.R.S. who was enabled to do this

through the munificence of Mr Baron Maseres The work makes two handsome quarto volumes, and though it is now more than half a century since it was composed by Agnesi, it must still be reckoned a very useful, as well as ingenious performance, and proves manifestly that the fame this lady acquired was a tribute of strict justice It is with regret, however, we add, that neither her inclination to these favourite intellectual pursuits, nor a desire of preserving and increasing the celebrity she had obtained, nor the intreaties of her father, could prevent her from dedicating herself to a monastic life amongst the nuns known by the name of the Blue Nuns Thus, by a mistaken and indefensible self-denial (at least on protestant principles), was the learned world deprived of the useful improvements in literature which her genius and knowledge would have enabled her to communicate, not only on subjects of a mathematical nature, but on many others of a different kind in which she had become eminent From the period of her retiring to the cloister, we conclude that her life was not chequered by any variety of incidents, other particulars respecting her we have sought in vain, nor have we been able to ascertain the time when death terminated the mortal existence of one of the brightest ornaments of the female sex

AGNIERS, the denomination of a tribe or canton of Iroquois Indians who vigorously and repeatedly resisted the French in their attempts to settle in Canada

AGNINA MEMBRANA (from *agnus*, a lamb, and *membrana* a membrane) The amnios, one of the membranes which involve the fetus, so called by Aetius from its tenderness and delicacy

AGNITION *s* (from *agnitio*, Lat) Acknowledgment

To AGNIZE *v a* (from *agnosco*, Lat) To acknowledge, to own obsolete (*Shaks*)

AGNOITÆ (from αγνοε *to be ignorant of*) In church history a sect of ancient heretics, who maintained that Christ considered as to his human nature, was ignorant of certain things and particularly of the time of the day of judgment

AGNOMEN, in Roman antiquity, a kind of fourth or honorary name given to a person on account of some extraordinary action, virtue, or accomplishment

AGNOMINATION *s* (*agnominatio* Lat) Allusion of one word to another (*Camden*)

A'GNUS CASTUS (from *agnus* a lamb, whose fleece resembles the down upon this plant, and *castus*, chaste, because the chaste matrons at the feast of Ceres strewed its leaves and flowers upon their beds, and lay upon them) The vitex agnus castus, foliis digitatis, serratis, spicis verticillatis of Linnæus Its seeds still form a part of the materia medica possessing when fresh a fragrant odour, and an acrid aromatic taste

Agnus dei, in the church of Rome a cake of wax stamped with the figure of a lamb supporting the banner of the cross These being consecrated by the pope with great solemnity and distributed among the people, are supposed to have great virtues; as, to preserve those who carry them worthily and with faith, from all manner of accidents, to expel evil spirits, &c The name literally signifies Lamb of God, this being supposed an image or representation of the Lamb of God who took away the sins of the world

AGO' *ad* (agan, Sax) Past as, *long ago*, that is, long time has past since (*Addison*)

AGOG *ad* In a state of desire (*South*)

AGOGE, in the ancient music, a species of modulation, wherein the sounds or notes proceed by continuous degrees of the scale, both rising and falling

Agoge (αγωγη, from αγω, *to estimate*) The deduction or reasoning upon diseases from their symptoms and appearances The order, state or tenour of the corporeal or mental constitution

AGOING *ad* (*a* and *going*) In action (*Lat*)

AGOMPHIASIS (*agomphiasis*, from α priv and γομφ, *compact*) A looseness of the teeth

AGON, in antiquity, a dispute or contest for the mastery, either in some exercise of the body, or of the mind There were agones on certain days in most of the ancient feasts, and other ceremonies in honour of the gods, or heroes

Agon, also signifies a minister in the heathen sacrifices, whose business it was to strike the victim

AGONE (αγονη, from α priv and γονος, *offspring*) Henbane so called from its supposed tendency to produce barrenness

Agone *ad* (agan, Sax) Ago, past (*Jonson*)

A'GONISM *s* (αγωνισμο, Gr) Contention for a prize

AGONES CAPITOLINI, games celebrated every fifth year upon the Capitoline hill Prizes were proposed for agility and strength, as well as for poetical and literary composition

AGONIA (*agonia* αγονια, from α priv and γονο *an offspring*) Sterility

Agonia (*agonia*, αγωνια, from αγωνιαω, *to struggle*) Agony as when there is a struggle between life and death Also fear and sadness of mind

AGONISMA in antiquity, the prize given to the victor in a combat or dispute

AGONISTARCHA, in antiquity, an officer much the same as the agonotheta

AGONISTES *s* (αγωνιςης, Gr) A prize-fighter, one that contends at a public solemnity for a prize (*Milton*)

AGONISTICI, in church history, those who publicly propagated the doctrines of Donatus

AGONISTIC, that which relates to the combats or agones of the ancients This word, among old physicians, signifies spring-water

AGONIUM, the place where the agones were celebrated

To A'GONIZE *v n* (*agoniser*, Fr) To feel agonies, to be in excessive pain (*Pope*)

AGONOTHETA, in Grecian antiquity,

the president, or superintendant, of the sacred games

AGONOUS, (*agonus*, from *α* priv and *γονο*, *offspring*) Barren In botany, not producing seeds or fruit

A'GONY *s* (*αγων*, Gr *agonie*, Fr) 1 The pangs of death (*Roscommon*) 2 Any violent pain of body or mind (*Milton*) 3 It is particularly used in devotion for our Redeemer s conflict in the garden (*Hooker*)

AGONYCLITÆ, or AGONYCLITES, in church history, a sect of Christians, in the 7th century, who prayed always standing, as thinking it unlawful to kneel

AGOOD *ad* (*a* and *good*) In earnest (*Shaks*)

AGORANOMUS, an Athenian magistrate, who regulated weight and measures, the price of provisions, &c

AGOUTY *s* An animal of the Antilles, of the bigness of a rabbit, with bright red hair, and a little tail without hair (*Trevoux*)

AGOWS, in geography, the inhabitants of a province of Abyssinia, which is bounded by the mountains of Amid Amid on the east, by Bure and Umbarma, and the country of the Gongas on the west, by Damot and Gojam on the south, and by Dingleber on the north There are two nations of the Agows, the one near the fountains of the Nile, called the Agows of Damot, from their vicinity to that province, the other near the head of the Tacazze, in the province of Lasta, called the Tcheratz Agows, from Tchera, a chief town tribe, and district, near Lasta and Begemder The country of Agows lies in a very elevated situation, forming a kind of amphitheatre of lofty mountains, and the climate of course is temperate and wholesome Many interesting particulars respecting the Agows are related in Bruce s Travels, vol i p 401, and iii p 527

AGRA, the principal kingdom of the Mogul empire in Asia It abounds with oranges and lemons, besides rice, indigo and cotton Its manufactures are white cloth, stuffs made of silk silver and gold lace, &c Its quota of force to the Mogul army is 15,000 horse, and 30,000 foot, and its revenue is computed at 3,000,000l sterling

AGRA, the metropolis of the above kingdom, was founded by Eckbar in 1566, who called it Eckbabat, and made it the seat of his empire It is 300 miles N E of Surat Lat 26 43 N Lon 76 45 E

To AGRACE *v a* (from *a* and *grace*) To grant favours to out of use (*Spenser*)

AGRARIAN *a* (*agrarius*, Lat) Relating to fields or grounds

AGRARIAN LAWS, among the Romans those relating to the division and distribution of lands, of which there were many, but that called the Agrarian law, by way of eminence, was published about the year of Rome 268, for dividing the conquered lands equally among all the citizens, and limiting the number of acres which each might enjoy Agrarian laws, either for dividing lands taken from the enemy, or the public lands, or those purchased with public money, were easily passed, but those whereby private rich men were to be deprived of their lands, and the common people put in possession of what had been held by the nobility, were never attempted without great disturbance —Several have pleaded for the necessity of agrarian laws among us, but, probably, none has entered so deeply into the subject as Harrington in his Oceana

To AGREASE *v a* (from *a* and *grease*) To daub, to grease (*Spenser*)

To AGREE *v n* (from *agréer*, Fr) 1 To be in concord (*Pope*) 2 To yield to, to admit (*Burnet*) 3 To settle amicably (*Clarendon*) 4 To settle terms by stipulation (*Matthew*) 5 To settle a price between buyer and seller (*Matthew*) 6 To be of the same mind or opinion (*Clar*) 7 To be consistent (*Mark*) 8 To suit with (*Locke*) 9 To cause no disturbance in the body (*Arb*)

To AGREE *v a* 1 To put an end to a variance (*Spenser*) 2 To make friends, to reconcile (*Roscom*)

AGREEABLE *a* (*agréable*, Fr) 1 Suitable to, consistent with (*Temple*) 2 Pleasing (*Addison*)

AGREEABLENESS *s* (from *agreeable*) 1 Consistency with, suitableness to (*Locke*) 2 The quality of pleasing (*Collier*) 3 Resemblance, likeness (*Grew*)

AGREEABLY *ad* (from *agreeable*) Consistently with, in a manner suitable to (*Swift*)

AGREED *particip a* (from *agree*) Settled by consent (*Locke*)

AGREEINGNESS *s* (from *agree*) Consistence suitableness

AGREEMENT *s* (*agrement*, Fren) 1 Concord (*Ecclus*) 2 Resemblance of one thing to another (*Locke*) 3 Compact, bargain (*Arbuthnot*)

AGREEMENT, in law signifies the consent of several persons to any thing done or to be done It also denotes a kind of writing or legal instrument by which the subscribing parties are bound to the performance of some specific act or covenant on certain terms and conditions therein specified Written agreements are not valid unless legally stamped within a limited time

AGRESTO (from *αγριος* *wild*) 1 Verjuice, which is manufactured from the wild apple or crab 2 The juice expressed from unripe grapes

AGRIA (from *αγριος*, *wild*) 1 The holly 2 A malignant pustule

AGRIAMPELUS (from *αγριος*, *wild*, and *αμπελος* *a vine*) The wild vine

AGRICANTHA (from *αγριος*, and *ακανθα*, *a thistle*) A species of carduus sylvestris, or wild thistle

AGRICOLA (Cnæus Julius), an eminent Roman commander, was born A D 40 His father, Julius Græcinus, was a great orator, and was put to death by Caligula for refusing to plead against Silanus Agricola was carefully brought up by his mother, Julia Procilla He served first in Britain, and on his return to Rome, married a lady of rank He was next made quæstor of Asia, and became tribune of the people, and prætor under Nero In the

commotions of 69, his mother was murdered, and her estate in Liguria plundered by the fleet of Otho. On his journey thither, he received the news of Vespasian's having assumed the government, and immediately exerted himself in his favour.—The twentieth legion having mutinied in Britain, he was sent thither to take the command, and to reduce them to obedience, in which he succeeded. After staying in Britain a considerable time, he returned to Rome, and was raised to the rank of patrician by Vespasian, who also made him governor of Aquitania, in Gaul. In 77, he was chosen consul with Domitian, and the same year married his daughter to Tacitus, the historian. Next year, he was appointed governor of Britain, where he soon restored tranquillity, and brought the natives to a love of the Roman language and manners. He extended his conquests into Scotland, and built a chain of forts from the Clyde to the Frith of Forth, to prevent the incursions of the inhabitants of the North. He defeated Galgacus on the Grampian hills, and then made peace with the Caledonians. On the accession of Domitian to the imperial throne Agricola had a triumph decreed to him, and was recalled. He then went into retirement, and died August 23, A. D. 93, leaving a widow and one daughter. *Watkins.*

AGRICULTURE. See HUSBANDRY and GARDENING.

AGRICULTURAL. *a.* Relating to agriculture.

AGRICULTURIST. *s.* One who devotes his time and attention to the cultivation of the earth.

AGRIELÆA. (αγριελαια, from αγριος and ελαια, *the olive tree*.) The wild olive tree.

AGRIFOLIUM. (from αχις, *a prickle*, and φυλλον, *a leaf*.) Agria. Holly. It should be rather acifolium, from its prickly leaves.

AGRIGENTUM, or AGRAGAS, in ancient geography, a very famous city on the south coast of Sicily, near the spot which is now occupied by Girgenti. The inhabitants of Agrigentum were corrupted and enfeebled by their addictedness to luxury and pleasure, and fell a sacrifice to the power of their enemies. Empedocles attempted their reformation; and, as Diogenes Laertius informs us, reproached them with devoting themselves every day to pleasure as if they were to die on the morrow, and with building their houses as though they were to live for ever. It is not easy to ascertain the precise time of the destruction of the old city, and the building of the new one.

AGRIMO'NIA. Agrimony. A genus of the class and order dodecandria digynia. Calyx five-toothed, invested with an outer one; petals five, inserted into the calyx; seeds two, in the bottom of the calyx. There are five species, four of which are indigenous to Europe, and one, the a. parviflora, to North America.

AGRIMONIA EUPATO'RIA (called *eupatoria*, from *Eupator*, its inventor; or *quasi hepatorium*, ηπατοριον, from ηπαρ, *the liver*, because it is useful in diseases of the liver.) The systematic name for the agrimonia of the pharmacopœias. See AGRIMONY.

AGRIMONT, one of the Ladrone isles, about 42 miles in circumference. Lat. 19. 40 N. Long. 146. 0 E.

AGRIMONY. See AGRIMONIA.

AGRIMONY, hemp. See EUPATORIUM.

AGRIMONY, bastard-hemp. See AGERATUM.

AGRIMONY, naked-headed-hemp. See VERBESINA.

AGRIMONY, water-hemp. See BIDENS.

AGRIOCARDAMUM. (αγριοκαρδαμον, from αγριος, *wild*, and καρδαμον, *the nasturtium*.) Wild garden cress.

AGRIOCASTANUM. (αγριοκαστανον, from αγριος and καστανον, *chesnut*.) The pig-nut, or earth-nut.

AGRIOCINARA. (αγριοκινάρα, from αγριος, and κιναρα, *an artichoke*.) The wild artichoke.

AGRIOCOCCIMELA. (αγριοκοκκιμηλα, from αγριος, *wild*, κοκκος, *a berry*, and μηλεα, *an apple-tree*.) The crab or wild apple.

AGRIOMELA, the same as AGRIOCOCCIMELA, and from the same derivation.

AGRION. (αγριον.) The herb hog's-fennel.

AGRION. A name given by Fabricius to certain species (constituting a tribe or family) of the libellula, or dragon-fly. See LIBELLULA.

AGRIOPASTINACA. (from *ager*, a field, and *pastinaca*, a carrot.) Wild carrot or parsnip.

AGRIOPHAGI, a name anciently given to those who fed on wild beasts.

AGRIOPHYLLUM. (αγριοφυλλον, from αγριος, and φυλλον, *a leaf*.) Agria. Hog's fennel, or peucedaneum.

AGRIORIGANUM. (αγριοριγανον, from αγριος, and οριγανον, *marjoram*.) Wild marjoram.

AGRIOSELINUM. (αγριοσελινον, from αγριος and σελινον, *parsley*.) Wild parsley.

AGRIOSITARI. (αγριοσιταρι, from αγριος, and σιτος, *wild wheat*.) A species of wild corn. Buck wheat.

AGRIPALMA. (αγριπαλμα, from αγριος, and παλμα, *a palm-tree*.) The herb motherwort, or wild palm.

AGRIPPA I. (Herod), was the grandson of Herod the great, and born A. M. 3997. He was brought up at Rome, and on his return to Judea was made by his grandfather governor of Iberia, where he lived so extravagantly as to incur Herod's displeasure. He then went to Rome, and attached himself to Caius the son of Germanicus, who succeeding Tiberius, made Agrippa tetrarch of Batanæa and Trachonitis, to which Claudius added the whole kingdom of Judea, with that of Chalcis. He commenced a persecution against the Christians to please the Jews, and put the apostle James the great to death. Being soon after at Cæsarea, he instituted games in honour of the emperor, at which the Tyrians waited on him to sue for a peace. On this occasion Herod made a dazzling appearance on his throne at the theatre. Josephus says, his fine robe was richly wrought with silver, which reflected the rays of the rising sun with an unusual and almost insupportable splendour.

so that when he spake his flatterers exclaimed that it was the voice of a god and not of a man. Receiving this impious adulation with pleasure, the historian Luke informs us, that "the angel of the Lord smote him, and he was eaten of worms (or vermin), and gave up the ghost." This happened in the year of Christ 44. Beza and Elsner think Luke's words may express the disease called morbus pedicularis, of which several persecuting and cruel princes have died. Josephus, probably, out of a partial fondness for Herod Agrippa, whom he had so much extolled, has concealed this particular, which was the true cause of those excruciating pains in the bowels of which both this Herod and his grandfather Herod the great died.

AGRIPPA II (Herod), son of the above, succeeded to the throne at the age of seventeen. St Paul pleaded his cause before him with so much eloquence, that Agrippa acknowledged that he had "almost persuaded him to be a Christian." He was greatly disliked by the Jews, and therefore resided chiefly at Rome, and died there about A.D. 94.

AGRIPPÆ. Those children were formerly so called who were born with their feet foremost, because Agrippa, the Roman, was said to be so born.

AGRIPPINIANS, in church history, the followers of Agrippinus bishop of Carthage in the third century, who first introduced and defended the practice of rebaptization.

A'GROPHOUS (αγριος, from αγρος, *wild*.) Wild, uncultivated, growing upon mountains.

AGROSTEMMA. Corn cockle, or wild lichnis. A genus of the Linnéan class and order decandria pentagynia, thus generically distinguished. Calyx one leaved, coriaceous; petals five, with claws, the border obtuse and undivided; capsule superior, one-celled, with a five-toothed orifice. There are four species: the githago, or common field-cockle, which adds much to the beauty of our arable grounds; the coronaria, or rose campion, the flos jovis, and coeli rosa, all which are elegant ornaments to our flower gardens, but the last is merely an annual, though of great beauty.

AGROSTIS. Bent grass. A genus of the Linnéan class and order triandria digynia, thus characterised. Calyx two-valved, one flowered, the valves acute, corol two-valved unequal, larger than the calyx, stigmas feathered. Of this grass there are at least forty six known species, of which eight are common to our own fields and hedges.

AGRO'UND. *ad.* (from *a* and *ground*.) 1. Stranded, hindered by the ground from passing farther (*Raleigh*). 2. Hindered in the progress of affairs.

AGRU'MINA (*quasi agnomina*, from αγ-...) Leeks, wild onions.

AGRYPNIA (αγρυπνια.) A privation of sleep; otherwise called watching, waking, ..., pervigilium, &c. In the Greek ...h, it is used for the vigil of any of the greater feast-days, observed by the monks and clergy.

AGRYPNOCO'MA (αγρυπνοκωμα, from αγρυπνος, *sleepless*, and κωμα, *a lethargy*.) Coma vigil. A lethargic kind of watchfulness, in which the patient is stupidly drowsy, but cannot sleep.

AGUA'PE (Indian.) The Brasilian name of the white water-lily.

AGUE, a general name for all periodical fevers, which, according to the returns of the feverish paroxysm, are denominated tertian, quartan, or quotidian. See FEBRIS INTERMITTENS.

AGUE TREE. See LAURUS.

AGUED. *a.* (from *ague*.) Struck with an ague shivering (*Shakspeare*).

A'GUE-FIT. *s.* (from *ague* and *fit*.) The paroxysm of the ague (*Shakspeare*).

AGU'IA (αγυια, from α priv. and γυιον, *a member*.) Paralytic or organic imbecility.

AGUILLANEUF, a form of rejoicing used among the ancient Franks on the first day of the year. The word is compounded of the French *a*, *to*, *gui*, *misletoe*, and *l'an neuf*, *the new year*. Its origin is traced from a Druid ceremony, in which the priests used to go yearly in December with them a sacred month to gather misletoe. The chief Druid climbing the oak, cut off the misletoe with a golden sickle, and the other Druids received it in a white cloth. On the first day of the year it was distributed among the people, after having blessed and consecrated it by crying au gui l'an neuf, to proclaim the new year.

AGUILON (Francis,) was a Jesuit of Brussels, and professor of philosophy at Doway, and of theology at Antwerp. He was one of the first that introduced mathematical studies into Flanders. He wrote a large work on Optics, in six books, which was published in folio, at Antwerp, in 1613, and a treatise of Projections of the Sphere. He promised also to treat upon Catoptrics and Dioptrics, but this was prevented by his death, which happened at Seville, in the year 1617.

A'GUISH. *a.* (from *ague*.) Having the qualities of an ague (*Granville*).

A'GUISHNESS. *s.* (from *aguish*.) The quality of resembling an ague.

A'GUL. (from *agul*, a circle, Arab.) The Syrian thorn: so called on account of its pliancy and use in making bands.

AGURAH, a Jewish coin, being $\frac{1}{20}$ of the silver shekel.

AGUSADURA, anciently a fee due from vassals to their lord, for sharpening their ploughing tackle.

AGUSTINE, an earth which forms, with acids, substances which are tasteless, as its name imports. It was discovered in the year 1800, by Trommsdorf, who found it in a mineral resembling the beryl. This earth resembles alumine, in not being acted on either by the fixed alkalies or ammoniac. It is not soluble in water, and by fire it acquires hardness, but no taste, and suffers no change in its solubility in acids. Supersaturated with phos-

phone acid it yields a salt of easy solubility, but its sulphat and acetite are very difficultly soluble.

AGUTIQUEPA'OBI (Indian) Dartwood, used by the Indians to cure wounds inflicted by arrows

A'GY (Indian) Pepper

AGYCI, in antiquity, obelisks sacred to Apollo, placed in the vestibules of houses

AGYNEIA In botany, a genus of the class and order monoecia monadelphia Calyx six-leaved, corolless Male three anthers on the rudiment of a style Female, germ perforated at the top, without style or stigma It is a native of China, and affords two species

AGYNIANI, in church history, a sect who condemned all use of flesh, and marriage as not instituted by God, but introduced at the instigation of the devil The word is compounded of the privative α and γυνη *woman* They are sometimes also called Agynnenses, and Agynii, and are said to have appeared about the year 694

AGYNOUS (αγυνος, from α priv and γυνος, *a female* i e chaste, not having known woman) Agnus castus

AGYRIA (αγυρτα, from αγειρω, *a crowd*) A quack or mountebank the doctor of the vulgar

AGYRTÆ, in antiquity, a kind of fortune-tellers, who pretended to cure diseases, expiate the crimes of the dead, torment their enemies, &c

AH *interject* 1 A word noting sometimes dislike and censure (*Isaiah*) 2 Sometimes contempt and exultation (*Psalms*) 3 Most frequently compassion and complaint (*Prior*)

AHA! AHA! *interject* A word intimating triumph and contempt (*Psalms*)

AHÆTULLA, in zoology, a species of coluber, in the order serpents Some authors call it the long green Bornea snake

AHASUERUS See ARTAXERXES I

AHEAD *ad* (from *a* and *head*) 1 Further onward than another (*Dryden*) 2 Headlong, precipitantly (*L'Estrange*)

AHEIGHT *ad* (from *a* and *height*) Aloft, on high (*Shakspeare*)

AHONAI See CERBERA

A-HULL, in the sea-language, the situation of a ship when all her sails are furled on account of the violence of the storm, and when, having lashed her helm on the lee-side, she lies nearly with her side to the wind and sea, her head being somewhat inclined to the direction of the wind

AI, in zoology, the bradypus tridactylus of Linnéus, or sloth, with three-toed feet and short tail

AJATOCHTLI, in zoology, a name given by Hernandez to the dasypus octocinctus, or eight-banded armadillo

AJAVA (Indian) A seed used in India as a remedy for the colic

AJAX, son of Telamon, was the bravest of all the Greeks in the Trojan war after Achilles He engaged Hector, with whom at parting he exchanged arms After the death of Achilles, Ajax and Ulysses disputed their claim to the arms of the dead hero. When they were given to the latter, it is said, Ajax was so enraged, that he slaughtered a whole flock of sheep, supposing them to be the sons of Atreus, who had given the preference to Ulysses, and stabbed himself with his sword The blood which ran to the ground from the wound, was changed into the flower hyacinth His body was buried at Sigæum, some say on mount Rhœtus His tomb was visited by Alexander

AJAX, the son of Oileus king of Locris, was surnamed Locrian, in contradistinction to the son of Telamon He also went with forty ships to the Trojan war, as being one of Helen's suitors According to Virgil, Minerva, enraged at the violence offered by him to Cassandra on the night Troy was taken, seized him in a whirlwind, and dashed him against a rock, where he expired, consumed by thunder

AJAX, in antiquity, a furious kind of dance, representing the madness of that hero, after his defeat by Ulysses

AJAX in entomology, a species of the papilio eques, being the papilio marcellus of Cramer

AJAX, in conchology a variety of the murex campas of Gmelin's Linnean system, called also rubeta

AICHSTADT, or LICHSTADT, a city of Germany, in the circle of Franconia, the capital of a district of the same name Lat 48 57 N Long 11 10 E

To AID *v a* (*aider*, Fr) To help, to support to succour (*Roscommon*)

AID *s* (from the verb) 1 Help, support (*Pope*) 2 The person that gives support, a helper, an auxiliary (*Tolet*) 3 A subsidy, money granted (*Cowell*)

AID in law, denotes a petition made in court to call in help from another person who has interest in land, or any other thing contested

AID-DE-CAMP, in military affairs, an officer employed to receive and carry the orders of a general

AID, *auxilium*, in ancient customs, a subsidy paid by vassals to their lord on various occasions, as when he was about to purchase new land, &c

AIDANCE *s* (from *aid*) Help, support little used (*Shakspeare*)

AIDANT *a* (*aidant*, Fr) Helping, helpful not in use (*Shakspeare*)

A'IDER *s* (from *aid*) He that brings aid, a helper, an ally (*Bacon*)

A'IDLESS *a* (from *aid*) Helpless, unsupported, undefended (*Milton*),

AIDS, in the manege, are helps, or assistances, by which the horseman contributes towards the motion, or action, required of the horse they commonly imply a discreet use of the bridle, caveson, spur, poinson, rod, calf of the leg, and voice, and also a just and well-timed motion of the body

AIGINE (from αἶξ, *a goat*) The same as CAPRIFOLIUM

AIGITHALUS See PARUS, or TITMOUSE

AIGRETTE, in zoology, a name given by Buffon to the simia aygula The same author likewise applies the name in ornithology, to different species of ardea

AIGUISCE, in heraldry, denotes a cross with its four ends sharpened, but so as to terminate in obtuse angles It differs from the cross fitchee, in as much as the latter tapers by degrees to a point, and the former only at the ends

AIGULET *s* (*aigulet*, Fr) A point with tags (*Spenser*)

AIKMAN (William,) a Scotch painter, was the only son of William Aikman, esq of Cairney, advocate, by Margaret, sister of sir John Clerk, of Pennycuik, bart and born October 24, 1682 He was educated with a view to the Scottish bar, but he soon abandoned the law, and devoted himself to painting In 1707, he went to Italy, and after studying three years, visited Turkey, from whence he returned to Rome, and remained there till 1712, when he set out for his own country In 1723, he removed to London, under the patronage of the duke of Argyle He painted many excellent pieces for some of the English nobility, chiefly portraits He died June 4th, 1731 Among the most intimate friends of Mr Aikman, were Somerville, Mallet, Allen Ramsay, and Thomson, each of whom paid an elegiac tribute to his memory Thomson's poem closes with the following beautiful lines

"A friend, when dead, is but remov'd from sight,
Sunk in the lustre of eternal light
And when the parting storms of life are o'er,
May yet rejoin us on a happier shore
As those we love decay, we die in part,
String after string is sever'd from the heart,
Till loosen'd life, at last, but breathing clay,
Without one pang is glad to fall away
Unhappy he who latest feels the blow,
Whose eyes have wept o'er every friend laid low,
Dragg'd ling'ring on from partial death to death,
Till dying, all he can resign is breath

To AIL *v a* (eglan, Saxon) 1 To pain, to trouble, to give pain (*Gen*) 2 To affect in any manner (*Dryden*)

AIL *s* (from the verb) A disease (*Pope*)

AILANTHUS, In botany, a genus of the class and order polygamia monoecia, of which the following is its generic character Herm Calyx five-parted; corol five-petalled stamens two or three Male, stamens ten Female, styles lateral, curved inwards, capsules from three to five, membranaceous, one-seeded The only known species of this tree is a native of China, of about forty feet in height.

AILE, in law, a writ which lies where a person's grandfather or great grandfather was seised of lands, &c in fee-simple, the day that he died, and a stranger abates and enters the same day, and dispossesses the heir of his inheritance

AILLSBURY, or AYLESBURY, the largest and most populous town in Buckinghamshire, having a market on Saturday This town shares the assizes with Buckingham It also sends two members to parliament Lat 51 45 N Long 0 42 W

AILING *part a* Sickly, full of complaints

AILMENT *s* (from *ail*) Pain, disease (*Swift*)

To AIM *v n* (*esmer*, Fr) 1 To direct a missive weapon, as to a mark (*Pope*) 2 To point the view, or direct the steps, toward any thing to tend toward, to endeavour to reach or obtain (*Tillotson*) 3 To guess

To AIM *v a* To direct the missile weapon, to point the weapon by the eye (*Dryden*)

AIM *s* (from the verb) 1 The direction of a missive weapon (*Dryden*) 2 The point to which the thing thrown is directed (*Shakspeare*) 3 A purpose, an intention, a design (*Pope*) 4 The object of a design (*Locke*) 5 Conjecture, guess (*Shakspeare*)

AINSWORTH (Robert,) was born at Woodgate near Manchester, in September 1660, and was educated at Bolton in Lancashire For a short period he kept a school at Bolton but afterwards went to London, and opened a considerable academy at Bethnal-green From thence he removed to Hackney, and afterwards to other places near London, where he taught with good reputation for many years Having acquired a moderate fortune, he declined this business, and after living privately a few years, died in April 1743, aged 83 years He published a short treatise of Grammatical Institutions but is more known on account of his excellent Thesaurus, or Latin and English Dictionary This work has gone through various editions under the superintendance of Patrick and Morell, the latter of whom published a useful abridgment in octavo

AIR *s* (*air* Fr *aer*, Lat) 1, The element encompassing the terraqueous globe (*Watts*) 2 The state of the air, or the air considered with regard to health (*Bacon*), 3 Air in motion, a small gentle wind (*Milton*) 4 Scent, vapour (*Bacon*) 5 Any thing light or uncertain (*Shakspeare*) 6 The open weather, air unconfined (*Dryden*) 7 Vent emission into the air (*Dryden*) 8 Publication, exposure to the public view and knowledge (*Pope*) 9 Music, whether light or serious (*Pope*) 10 Poetry, a song (*Milton*) 11 The mien, or manner, of the person (*Addison*) 12 An affected or laboured manner of gesture (*Swift*) 13 Appearance (*Pope*). Upon some of these acceptations it will be necessary to speak much more particularly, as below

AIR, in natural philosophy and chemistry, a general term used to denote such invisible and

exceedingly rare fluids as possess a very high degree of elasticity, and are not condensable into a visible fluid state by any degree of cold we are acquainted with. By this last circumstance air is distinguished from vapour, which is condensable by cold. This term was originally, and for a long time peculiarly, applied to the air of which our atmosphere is composed, and in this sense we shall here consider it. The different kinds of air, now comprehended under the general term gas, which the researches of chemistry have discovered, will be mentioned farther on, and references made to those terms by which they are expressed in the nomenclature now adopted, and under which distinct accounts of them are given.

AIR, ATMOSPHERIC, is an invisible, insipid, inodorous, heavy, and elastic fluid, possessing great mobility, susceptible of rarefaction and of condensation; it surrounds the terrestrial globe to a certain height, the entire mass constituting the atmosphere. The consideration of this fluid must excite a very lively interest, since it is the depository of the signs of our thoughts and our affections, at the same time that it serves for the preservation of life in every animated being. Its physical and its chemical properties will successively fix our attention.

I. *Physical Properties of Air.*

The most important physical or mechanical properties of air, are its fluidity, its weight, and its elasticity.

1. *Its Fluidity.*—The great fluidity of the air is manifest from the great facility with which bodies traverse it, as in the propagation of, and easy conveyance it affords to sounds, odours and other effluvia and emanations that escape from bodies; for these effects prove that it is a body whose parts give way to any force, and in yielding are easily moved amongst themselves, which is the definition of a fluid. That the air is a fluid is also proved from this circumstance, that it is found to exert an equal pressure in all directions; an effect which could not take place otherwise than from its extreme fluidity. Neither has it been found that the air can be deprived of this property, whether it be kept for many years together confined in glass vessels, or be exposed to the greatest natural or artificial cold, or condensed by the most powerful pressure; for in none of these circumstances has it ever been reduced to a solid state.

2. *Its Weight or Gravity.*—The weight or gravity of the air, is a property belonging to it as a body; for gravity is a property essential to matter, or at least a property found in all bodies. But independent of this, we have many direct proofs of its gravity from sense and experiment: thus, the hand laid close upon the end of a vessel, out of which the air is drawn at the other end, soon feels the load of the incumbent atmosphere; thus also, thin glass vessels, exhausted of their air, are easily crushed to pieces by the weight of the external air. Again, if a tube close at one end, be filled with quicksilver, and the open end be immerged in a bason of the same fluid, and so held upright, the quicksilver in the tube will be kept raised up in it to the height of about thirty inches above the surface of that in the bason, being supported and balanced by the pressure of the external air upon that surface; and that this is the cause of the suspension of the quicksilver in the tube, is made evident by placing the whole apparatus under the receiver of an air-pump, for then the fluid will descend in the tube in proportion as the receiver is exhausted of its air; and then on gradually letting in the air again, the quicksilver reascends to its former height in the tube; and this is what is called, from its inventor, the Torricellian experiment. Nay farther, air can actually be weighed like any other body; for a rigid vessel, full even of common air, by a nice balance is found to weigh more than when the air is exhausted from it; and the effect is proportionally more sensible, if the vessel be weighed full of condensed air, and more still if it be weighed in a receiver void of air.

But although we have innumerable proofs of the gravitating property of the air, yet the full discovery of the laws and circumstances of it are certainly due to the moderns. It cannot indeed be denied that several of the ancients had some confused notions about this property: thus Aristotle says that all the elements have gravity, and even air itself; and as a proof of it, says that a bladder inflated with air, weighs more than the same when empty; and Plutarch and Stobæus quote him as teaching that the air in its weight is between that of fire and of earth; and farther, he himself treating of respiration, reports it as the opinion of Empedocles, that he ascribes the cause of it to the weight of the air, which by its pressure forces itself into the lungs; and much in the same way are the sentiments of Asclepiades expressed by Plutarch, who represents him as saying, among other things, that the external air, by its weight, forcibly opened its way into the breast. But nevertheless it is certain, however unreasonable it may seem, that Aristotle's followers departed in this instance from their master, by asserting the contrary for many ages together. Indeed several of the phenomena arising from this property, have been remarked from the highest antiquity. Many centuries since, it was known that by sucking the air from an open pipe, having its extremity immersed in water, this liquid rises above its level, and occupies the place of the air. In consequence of such observations, sucking pumps were contrived, and various other hydraulic machines, as Heron's syphons, described in his Spiritali or Pneumatics, and the watering-pots known in Aristotle's time under the name of clepsydræ, which alternately stop or run as the finger closes or opens their upper orifice. Indeed the reason assigned, by philosophers many ages after, for this phenomenon, was a pretended horror that nature conceives for a vacuum, which, rather than endure it, makes a body ascend contrary to the powerful solicitation of its gravity.

Galileo was well apprised of the weight of

the air as a body in his Dialogues he shews two ways of demonstrating it, by weighing it in bottles; the transition was easy from one discovery to another yet still Galileo's knowledge of the matter was imperfect, that is, as to the particular instance of the suspension of a fluid above its level, by the pressure of the external air

At length Torricelli fell upon the lucky guess, that the counterpoise which keeps fluids above their level, when nothing presses upon their internal surface, is the mass of air resting upon the external one He discovered it in the following manner In the year 1643, this disciple of Galileo, on occasion of executing an experiment on the vacuum formed in pumps, above the column of water, when it exceeds 34 feet, thought of using some heavier fluid, such as quicksilver He conceived that whatever might be the cause by which a column of water of 34 feet high is sustained above its level, the same force would sustain a column of any other fluid, which weighed as much as that column of water, on the same base, whence he concluded that quicksilver, being about 14 times as heavy as water, would not be sustained higher than 29 or 30 inches He therefore took a glass tube of several feet in length, sealed it hermetically at one end, and filled it with quicksilver, then inverting it, and holding it upright, by pressing his finger against the lower or open orifice, he immersed that end in a vessel of quicksilver, then removing his finger, and suffering the fluid to run out, the event verified his conjecture, the quicksilver, faithful to the laws of hydrostatics, descended till the column of it was about 30 inches high above the surface of that in the vessel below And hence Torricelli concluded that it was no other than the weight of the air incumbent on the surface of the external quicksilver, which counterbalanced the fluid contained in the tube

By this experiment Torricelli not only proved, what Galileo had done before, that the air had weight, but also that it was its weight which kept water and quicksilver raised in pumps and tubes, and that the weight of the whole column of it was equal to that of a like column of quicksilver of 30 inches high, or of water 34 or 35 feet high but he did not ascertain the weight of any particular quantity of it, as a gallon, or a cubic foot of it, nor its specific gravity to water, which had been done by Galileo; though to be sure with no great accuracy, for he only proved that water was more than 400 times heavier than air

Torricelli's experiment became famous in a short time. Father Mersenne, who kept up a correspondence with most of the literati in Italy, was informed of it in 1644, and communicated it to those of France, who presently repeated the experiment Messrs Pascal and Petit made it first, and varied it several ways, which gave occasion to the ingenious treatise which Pascal published at twenty-three years of age, intitled Experiences Nouvelles touchant la Vuide. In this treatise indeed he makes use of the old principle of fuga vacui, but afterwards getting some notion of the weight of the air, he soon adopted Torricelli's idea, and devised several experiments to confirm it One of these was to procure a vacuum above the reservoir of quicksilver, in which case he found the column sink down to the common level but this appearing to him not sufficiently powerful to dissipate the prejudices of the ancient philosophy, he prevailed on M Perier, his brother in law, to execute the famous experiment of Puy-de-Domme, who found that the height of the quicksilver half-way up the mountain was less, by some inches, than at the foot of it, and still less at the top so that it was now put out of doubt that it was the weight of the atmosphere which counterpoised the quicksilver

Des Cartes too had a right notion of this effect of the air, to sustain fluids above their level, as appears by some of his letters about this time, and some years before; and in one of those he lays claim to the idea of the Puy de Domme experiment

A quantity of air was next weighed by Mersenne in a very ingenious manner But Mr Boyle, by a more accurate experiment, found the proportion to be that of 938 to 1 And Mr Hauksbee found it as 850 to 1, proceeding on the same principles as Mersenne, with a three-gallon glass bottle but extracting the air out of it with the air-pump instead of expelling it by fire, the height of the barometer being at that time 29 7 inches Also by other accurate experiments made before the Royal Society by Mr Hauksbee, Dr Halley, Mr Cotes, and others, the proportion was always between 800 and 900 to 1, but rather nearer the latter, namely, being first found as 840 to 1, then as 852 to 1, and a third time as 860 to 1 the barometer then standing at 29¾ inches, and the weather warm Mr Cavendish determines the ratio 800 to 1, the barometer being 29¾, and the thermometer at 50°, and sir George Shuckburg, by a very accurate experiment, finds it 836 to 1, the barometer being at that time at 29 27, and the thermometer at 51° And the medium of all these is about 832 or 833 to 1, when reduced to the pressure of 30 inches of the barometer, and the mean temperature 55° of the thermometer Upon the whole therefore it may be safely concluded that, when the barometer is at 30 inches, and the thermometer at the mean temperature 55°, the density or gravity of water is to that of air, as 833⅓ to 1, that is as $\frac{2500}{3}$ to 1, or as 2500 to 3, and that for any changes in the height of the barometer, the ratio varies proportionally, and also that the density of the air is altered by the $\frac{1}{440}$th part for every degree of the thermometer above or below temperature

This number, which is a very good medium among them all, we have chosen with the fraction ⅓, because it gives exactly 1⅕ ounce for the mean weight of a cubic foot of air, the weight of the cubic foot of water being just 1000 ounces averdupois, and that of quicksilver equal to 13600 ounces.

Air, then, having been shewn to be a heavy fluid substance, the laws of its gravitation and pressure must be the same as those of water and other fluids; and consequently its pressure must vary with its perpendicular altitude. Which is exactly conformable to experiment; for on removing the Torricellian tube to different heights, where the column of air is shorter, the column of quicksilver which it sustains is shorter also, and that nearly at the rate of 100 feet for $\frac{1}{10}$ of an inch of quicksilver. And on these principles depend the structure and use of the barometer.

From the same principle it likewise follows that air, like other fluids, presses equally in all directions. And hence it happens that soft bodies endure this pressure without change of figure, and hard or brittle bodies without breaking, being equally pressed on all parts: but if the pressure be taken off, or diminished, on one side, the effect of it is immediately perceived on the other. See ATMOSPHERE, for the total quantity of effects and pressure, and the laws of different altitudes, &c.

From the weight and fluidity of the air, jointly considered, many effects and uses of it may easily be deduced. By the combination of these two qualities, it closely invests the earth, with all the bodies upon it, constringing and binding them down with a great force, namely a pressure equal to about 15 pounds upon every square inch. Hence, for example, it prevents the arterial vessels of plants and animals from being too much distended by the impetus of the circulating juices, or by the elastic force of the air so copiously abounding in them. For hence it happens, that on a diminution of the pressure of the air, in the operation of cupping, we see the parts of the body grow tumid, which causes an alteration in the circulation of the fluids in the capillary vessels.

3. *Elasticity*. Another quality of the air, from whence arise a multitude of effects, is its elasticity, a quality by which it yields to the pression of any other bodies, by contracting its volume, and dilates and expands itself again on the removal or diminution of the pressure. This quality is the chief distinctive property of air, the other two being common to other fluids also.

Of this property we have innumerable instances. Thus, for example, a blown bladder being squeezed in the hand, we find a sensible resistance from the included air, and upon taking off the pressure, the compressed parts immediately restore themselves to their former round figure. And on this property of elasticity depend the structure and uses of the air-pump.

Every particle of air makes a continual effort to dilate itself, and so it acts forcibly against all the neighbouring particles, which also exert the like force in return; but if their resistance happen to cease, or be weakened, the particle immediately expands to an immense extent. Hence it is that thin glass bubbles, or bladders, filled with air, and placed under the receiver of an air-pump, do, upon pumping out the air, burst asunder by the force of the air which they contain. So likewise a close flaccid bladder, containing only a small quantity of air, being put under the receiver, swells as the receiver is exhausted, and at length appears quite full. And the same thing happens by carrying the flaccid bladder to the top of a very high mountain.

The same experiment shews that this elastic property of the air is very different from the elasticity of solid bodies, and that these are dilated after a different manner from the air. For when air ceases to be compressed, it not only dilates, but then occupies a far greater space, and exists under a volume immensely greater than before, whereas solid elastic bodies only resume the figure they had before they were compressed.

It is plain that the weight or pressure of the air does not at all depend on its elasticity, and that it is neither more nor less heavy than if it were not at all elastic. But from its being elastic, it follows that it is susceptible of a pressure, which reduces it to such a space, that the force of its elasticity, which re-acts against the pressing weight, is exactly equal to that weight. Now the law of the elasticity is such, that it increases in proportion to the density of the air, and that its density increases in proportion to the forces or weights which compress it. But there is a necessary equality between action and re-action, that is, the gravity of the air, which effects its compression, and the elasticity of it, which gives its tendency to expansion, are equal.

So that, the elasticity increasing or diminishing, in the same proportion as the density increases or diminishes, that is, as the distance between its particles decrease or increase, it is no matter whether the air be compressed, and retained in any space, by the weight of the atmosphere, or by any other cause, as in either case it must endeavour to expand with the same force. And therefore, if such air as is near the earth be inclosed in a vessel, so as to have no communication with the external air, the pressure of such inclosed air will be exactly equal to that of the whole external atmosphere. And accordingly we find that quicksilver is sustained to the same height, by the elastic force of air inclosed in a glass vessel, as by the whole pressure of the atmosphere.—And on this principle of the condensation and elasticity of the air depend the structure and use of the air-gun.

That the density of the air is always directly proportional to the force or weight which compresses it, was proved by Boyle and Mariotte, at least as far as their experiments go on this head: and Mr Mariotte has shewn that the same rule takes place in condensed air. However, this rule is not to be admitted as scrupulously exact; for when air is very forcibly compressed, so as to be reduced to $\frac{1}{4}$th of its ordinary bulk, the effect does not answer precisely to the rule, for in this case the air begins to make a greater resistance, and requires a

stronger compression, than according to the rule. And hence it would seem, that the particles of air cannot, by means of any possible weight or pressure, how great soever, be brought into perfect contact, or that it cannot thus be reduced to a solid mass: and consequently that there must be a limit to which this condensation of the air can never arrive. And the same remark is true with regard to the rarefaction of air, namely, that in very high degrees of rarefaction, the elasticity is decreased rather more than in proportion to the weight or density of the air, and hence there must also be a limit to the rarefaction and expansion of the air, by which it is prevented from expanding to infinity.

The elasticity of the air exerts its force equally in all directions, and when it is at liberty, and freed from the cause which compressed it, it expands equally in all directions, and in consequence always assumes a spherical figure in the interstices of the fluids in which it is lodged. This is evident in liquors placed in the receiver of an air-pump, by exhausting the air: at first there appears a multitude of exceeding small bubbles, like grains of fine sand, dispersed through the fluid mass, and rising upwards, and as more air is pumped out, they enlarge in size, but still they continue round. Also if a plate of metal be immerged in the liquor, on pumping, its surface will be seen covered over with small round bubbles, composed of the air which adhered to it, now expanding itself. And for the same reason it is that large glass globes are always blown up of a spherical shape, by blowing air through an iron tube into a piece of melted glass at the end of the pipe.

The expansion of the air, by virtue of its elastic property, when only the compressing force is taken off, or diminished, is found to be surprisingly great, and yet we are far from knowing the utmost dilatation of which it is capable. In several experiments made by Mr Boyle, it expanded first into 9 times its former space, then into 31 times, then into 60, and then into 150 times. Afterwards, it was brought to dilate into 8000 times its first space; then into 10000, and at last even into 13679 times its space, and this solely by its own natural expansive force, by only removing the pressure, but without the help of fire. And on this principle depend the construction and use of the MANOMETER.

The elasticity of the air, under one and the same pressure, is still farther increased by heat, and diminished by cold, and that, by some fine accurate experiments made by sir George Shuckburgh, at the rate of the 440th part of its volume nearly, for each degree of the variation of heat, from that of temperate, in Fahrenheit's thermometer.

This property explains the common effect observed on bringing a close flaccid bladder near the fire to warm it; when it is presently found to swell as if more air were blown into it. And upon this principle depend the structure and office of the thermometer, as also in air-balloons.

The elastic power of the air becomes the second great source of the remarkable effects of this important fluid. By this property it insinuates itself into the pores of bodies, where, by means of this virtue of expanding, which is so easily excited, it must put the particles of those bodies into perpetual vibrations, and maintain a continual motion of dilatation and contraction in all bodies, by the incessant changes in its gravity and density, and consequently its elasticity and expansion.

This reciprocation is observable in several instances, particularly in plants, in which the tracheæ or air-vessels perform the office of lungs, for as the heat increases or diminishes, the air alternately dilates and contracts, and so by turns compresses the vessels, and eases them again, thus promoting a circulation of their juices. And hence it is found that no vegetation or germination is carried on in vacuo.

It is from the same cause, too, that ice is burst by the continual action of the air contained in its bubbles. Thus, too, glasses and other vessels are frequently cracked, when their contained liquors are frozen, and thus also large blocks of stone, and entire columns of marble, sometimes split in the winter season, from some little bubble of included air acquiring an increased elasticity: and for the same reason it is that so few stones will bear to be heated by a fire, without cracking into many pieces: by the increased expansive force of some air confined within their pores.

From the circumstance that the space occupied by a determinate quantity of air is in the inverse ratio of the elastic force, it follows, that, with the same given temperature, the elasticity of two moleculæ of air does not augment by their mutual approach.

To render this conclusion sensible, conceive a mass of air included in a bladder which communicates with a recurved or syphon-like tube containing mercury, and suppose that its elastic force is in equilibrio with a column of mercury of 30 inches in height, if the bladder be compressed in such manner that the air shall be reduced to half its volume, the stratum of air contiguous to the surface of the liquid mercury will evidently have a density twice as great as it had before the compression, and consequently a double number of molecula of air will touch and act upon that surface, therefore, since according to the experiment, the height of the column of mercury has been doubled, the elasticity of each molecule has necessarily been the same. Hence it follows, as we have stated, that with a given temperature, the elasticity of the moleculæ of air is not increased by their mutual approach, it merely multiplies the number of moleculæ acting upon an assumed surface.

The truth thus established manifestly leads to the following results.

1. The moleculæ of a gas yield sensibly only to the repulsive force of caloric, and the attraction which they exercise one upon another is very small with respect to that force: thus their elasticity depends exclusively upon the

temperature, and the quantity of free caloric which exists in a mass of air is, at equal temperatures, proportional to its volume for, if there were more under the same volumes in the state of condensation than in that of dilatation, the repulsive force of two neighbouring moleculæ would be augmented

2 If the volume of a gas be diminished a third or a half, there must be disengaged a third or a half of the free caloric which existed between its moleculæ The effect of the caloric thus disengaged is perceptible upon the velocity of sound, it produces the excess of that velocity over that given by the ordinary theory, as has been shewn by the calculus of Laplace and others

3 If we conceive equal volumes of two different gases comprised in two envelopes of the same capacity, and inextensible, and suppose that, at a given temperature, the elasticity of these two gases is the same on augmenting in the same manner their temperature, the augmentation of their elasticity will be the same, since it depends only upon their temperature If we now conceive the envelopes comprising the two gases to become extensible, these gases will dilate until their elasticity is in equilibrio with the pressure of the atmosphere surrounding the envelopes, and since for each gas the volume is in the inverse ratio of the elastic force, the two gases will assume the same volume and will dilate equally, which is conformable to experience

II *Chemical Properties of Atmospheric Air*

1 *The Dissolving Faculty of Air* Air and water exert upon one another a reciprocal, but unequal, attraction, in virtue of which the water dissolves the air, and the air the water, but in a greater proportion, for if well dried air be left upon water duly purged, both of them will satisfy their reciprocal attraction, and two saturations will be established a cubic foot of air will give ten or twelve grains of water Chemistry furnishes many examples of bodies which thus divide themselves in the ratio of their attractions

It is the property of any dissolvent whatever to impart to the substance dissolved its form and density, whence it results that the water by being dissolved in the air has lost its liquidity and acquired aeriform fluidity and that the air on being dissolved in water loses its aeriform state and acquires that of liquidity The air contained in water is not therefore, in the elastic state, it has assumed the form and very nearly the density of water, and consequently it will not affect its transparency

The solution of water in air constitutes evaporation, which must be carefully distinguished from vaporization, the latter consisting in the solution of water through the operation of caloric See EVAPORATION and VAPORIZATION

The dissolving faculty of the air is in the ratio of its temperature and of the pressure which it experiences, and, as the temperature and pressure of the atmosphere suffer great and frequent variations, it results that the air becomes sometimes more, sometimes less, greedy of water, so that it raises it, or precipitates it, according to circumstances hence come rain, dews, snow, and in general all the aqueous meteors of which the atmosphere is the theatre See RAIN, DEW, &c

1 *Composition, &c of Air* During many ages the air we breathe was considered as a simple homogeneous fluid various exhalations, indeed and particles of bodies continually arising from the earth, were observed to be mixed with it, and upon these were supposed to depend its different degrees of salubrity, but the aeriform fluid itself was never, till the latter end of the eighteenth century, known to be a compound substance This point, however, has been clearly ascertained by the discoveries of modern chemists, particularly those of Dr Priestley, Black, Cavendish, Lavoisier, Fourcroy &c From the united testimony of these discoveries, we are authorized to conclude that atmospheric air is composed of at least two species of air or elastic fluid, which are called vital air or oxygen gas, and azotic gas The first of these is the great agent in respiration and combustion, and upon the proper proportion of it depends the purity of the atmosphere the latter possesses contrary qualities, is noxious to animals, and incapable of maintaining combustion The proportion of these in 100 parts of atmospheric air, is commonly about 26 or 27 parts of vital air, and 74 or 73 parts of azotic gas by weight, or about 22 parts of the former, and 78 of the latter, by bulk

The component principles of atmospheric air may be ascertained by the following experiment If heat be applied to mercury enclosed in a proper vessel of this air, the air will be diminished, and the mercury will lose its splendour, gradually changing to a reddish powder, and acquiring an addition to its weight When no further change is observed, the separation of the principles of air has taken place That portion of the air which remains in the receiver is unfit for supporting flame, or maintaining respiration, and is azotic gas, the other part, which is oxygen gas, is absorbed by the mercury, which it reduces to the state of an oxide, and from which it may afterwards be extracted by heat By this last operation the mercury will be restored to its metallic state, and will lose the weight it had acquired during its oxidation These separated gases, thus differing in their properties from each other, and from atmospheric air, being again mixed in the proportion above stated, form atmospheric air of the ordinary degree of purity, differing from it, however, in some trifling respects, which do not invalidate the general conclusion, but which are probably occasioned by our inability to combine the ingredients so perfectly as they are combined by nature The air of the atmosphere, however, is not so simple as to be formed of only two species of elastic fluid for, beside the numerous particles of water and other substances it contains (for an account of which see AT-

MOSPHERE), a small quantity of carbonic acid gas or fixed air is found in it, in the proportion of about one hundredth part, and a still smaller quantity of hydrogen gas

Indeed the determination of the nature and proportion of the constituent parts of the atmosphere is a delicate problem, respecting which it is reasonable to expect some slight difference in the results Mr Dalton, who has made many interesting researches on this topic, gives the following results

Table of the weights of the different gases constituting the atmosphere

	Inches of mercury
Azotic gas	23.36
Oxygenous gas	6.18
Aqueous vapour	.44
Carbonic acid gas	.02
	30.00

Table of the proportional weights of the different gases in a volume of atmospheric air, taken at the surface of the earth

	per cent
Azotic gas	7[illegible]
Oxygenous gas	23.[illegible]2
Aqueous vapour	1.03 variable
Carbonic acid gas	.10
	100.00

Mr Cavendish is the first who endeavoured to establish that the proportions of the two principal elements of the atmospheric air were constant, notwithstanding the distance of places and the difference of temperatures The observations since made by M de Marty in Spain M Berthollet in Egypt and in France, Mr Davy in England, and Dr Beddoes on the air brought from the coast of Guinea, seem to have confirmed this grand result But one of the finest experiments is that of Gay Lussac (mentioned article AEROSTATION) who brought down air from the height of 6900 metres and this air being analysed on his return, gave the constituent principles in the same proportions, a proof that the chemical constitution of the atmosphere is the same at those great latitudes as at the surface of the earth This result has been farther confirmed by the experiments of Humboldt and Gay-Lussac on Eudiometry the air of the surface of the earth, analysed at different days, at various hours and temperatures presented no change in its composition It always contained 0 21 of oxygen in volume, 0 783 of azote, 0 003 of hydrogen, and 0·004 of carbonic acid gas

Mr Dalton considers the general atmosphere as composed of four fluids principally, or four particular atmospheres, namely, those of the four gases mentioned above These he supposes to be totally unconnected with each other, the particles of the one not acting on the particles of the other, agreeably to his opinion that in a mixture of two or more different elastic fluids, the particles of the one fluid neither attract nor repel those of the others, differing in this from the particles of homogeneous elastic fluids, which repel each other with a force reciprocally proportional to the distance of their centres from each other Applying this principle to the atmospheric air, he supposes that the density and elastic force of each gas, at the earth s surface, are the effects of the weight of the atmosphere of that gas solely, the different atmospheres not gravitating one upon another

But many objections drawn both from the principles of chemistry, and those of hydrostatics, have been urged against this hypothesis especially by Berthollet, Hauy, Gough, and Thomson to whose writings the reader may be referred for satisfaction, as to this particular

The most distinguishing chemical properties of atmospheric air, are the support it administers to combustion, and to the respiration of animals, both which depend upon the presence of oxygen It has been long known that combustion can never take place without the help of air, and that it is always in proportion to the purity and the quantity of that fluid Ever since the time of Boyle, who discovered these facts philosophers have been much occupied in considering them, and various hypotheses have been offered to explain them Boerhaave thought that air contributed to combustion by operating on the surfaces of combustible bodies, so as to dissect them, if the expression may be allowed, into their component particles, others supposed that air was necessary to confine the flame about the body, and not suffer it to be dissipated before combustion was effected But neither of these will explain why combustion renders air unfit for that purpose a second time, or why the same air could not equally promote it at all times Indeed every thing on this subject was mere conjecture before the discovery of vital air by Priestley, and the elaborate researches of Lavoisier, which together have very clearly shewn us that, in every instance of combustion which takes place in atmospheric air, the air itself is decomposed its vital part, i e oxygen gas, is absorbed by the combustible body, and the azotic gas is set at liberty, that combustion is less rapid and intense in atmospheric air, than in oxygen gas alone and that no combustion can possibly take place where this gas is not present These principles will be more amply detailed and illustrated in the article COMBUSTION

In respiration also, the air is decomposed Being inhaled by the lungs, its oxygen combines with the carbon disengaged by the blood, and thus forms carbonic acid, which, together with azotic gas, is exhaled Respiration is in fact but a slower combustion, in which part of the heat of vital air enters the blood as it passes through the lungs, and is by it conveyed through the whole body, and thus animal bodies are supplied with heat, to compensate for that which they are constantly giving out to the atmosphere and other surrounding bodies A more particular account of the different pro-

cesses of respiration will be given under that word these hints are sufficient for our present purpose

Atmospheric air is also very useful in chemical experiments, many of which could not be performed without it, as its presence is necessary either for preserving a proper temperature, or for supplying one or other of the gaseous substances which it holds in combination

From the whole, then, it is evident that, as the action of combustion and respiration is constant and universal the air which encompasses our globe is suffering continual alterations, and the great consumption of oxygen by these and other different processes, might lead us to fear a deficiency of this essential fluid in the atmosphere, if the wisdom of Providence, which is every where manifest, had not furnished means for restoring the purity of the air, which upon the whole are equal in effect to those which destroy it Among the most important of these are the leaves of vegetables, which exist so plentifully throughout nature, and which have the singular property of imbibing oxygen from the moisture which promotes their growth and from the air by night and in the day-time pouring into the atmosphere increased quantities of this enlivening fluid This purifying quality of vegetables was discovered by Dr Priestley Another mode by which the vitiated state of the atmosphere is corrected, is the agitation of the sea, and other large bodies of water which thus carry off many noxious particles

When the air is vitiated by putrefaction, and other similar processes its putridity may be corrected by means of lime, and substances which are putrifying may also be neutralised in a great degree by throwing upon them a mixture of lime, water, and ashes or soap ley For the purpose of destroying the contagion of infected air Dr C Smith employed the fumes of nitric acid, Morveau, muriatic acid gas, and Mr Cruickshank, oxy-muriatic acid gas these are all efficacious, but the last, which is now employed with the greatest success in the British navy and military hospitals, acts with more energy than the others, and is easily procured by the following method Let two parts of muriate of soda (common salt) be mixed with one part of the black oxide of manganese let the mixture be placed in an open vessel in the infected apartment, and two parts of sulphuric acid poured upon it The fumes of oxymuriatic acid are immediately exhaled, fill the room and destroy the contagion It has been recommended to artizans who are much employed over a charcoal fire to place near them a flat-bottomed vessel filled with lime-water, which should be renewed every day, or so often as a variegated film or pellicle appears floating on the water

Air, factitious, or artificial, a name given by Boyle to all those elastic fluids which he found produced in chemical experiments, and to be different from the air of the atmosphere Since his time their number is so much increased, and their properties are so well known, as to require separate names to distinguish them They are as follow

1 *Acid*, or *Marine Air* The same as that which is now called Muriatic acid gas, which see

2 *Alkaline Air*, an account of which is given under the term Ammoniacal gas

3 *Fixed, Fixable, or Mephitic Air* See Carbonic acid gas

4 *Dephlogisticated, Vital*, or *Pure Air*, or *Scheele's Air of Fire* See Oxygen gas

5 *Dephlogisticated Marine Air* See Oxymuriatic acid gas

6 *Dephlogisticated Nitrous Air* See Nitrous oxyd

7 *Fluoric Acid*, or *Sparry Acid Air* See Fluoric acid gas

8 *Inflammable Air* See Hydrogen gas

9 *Heavy Inflammable Air* See Carbon, gaseous oxyd of, or Carbonated hydrogen gas

10 *Sulphurated Inflammable*, or *Hepatic Air* See Hydrogen gas, sulphurated

11 *Nitrous Air* See Nitrous gas

12 *Prussic Acid Gas*

13 *Phlogisticated, Nitrogenous*, or *Mephitic Air* See Azotic gas

14 *Vitriolic Acid Air* See Sulphuric acid gas

To which may be added,

15 *Olefiant Gas*

On the subject of air the student may consult with advantage Priestley's Observations, in five volumes octavo Lavoisier's Elements of Chemistry, octavo, Fourcroy's Chemistry four volumes octavo, and Lavoisier's Essays, Chemical and Physical, vol i where a history of the discoveries is given, which are also well related in Dr Gregory's Economy of Nature, vol i

Air, in music, signifies the melody, or the inflexion of a musical composition According to Dr Busby the strict import of the word is confined to vocal music, though it has generally been extended to that which is sung or played, and forms that chain of sounds which is called a tune Frequently, the principal vocal part is called the air

Air, in the manage, is that cadence or liberty of motion in a horse, which naturally disposes him to work in the manage, and rise with facility, measure, and justness of time

Many riding masters take the word air in a confined sense, as signifying only a manage that is higher, slower, and of a more complex nature than the terra a terra, while others allow it a more extensive signification, so as to include the terra a terra, in which, if the horse manage well, they say "the rider has hit upon the air of the horse" The walk, trot, and gallop, are in general not accounted airs, and yet there are some very good masters who by the word air signify the motion of a horse's legs upon a gallop For instance, they say, such a horse has not a good or natural air, or in other words he does not bend his fore legs sufficiently —High airs, or high manage, are the

motions of a horse that rises higher than the terra a terra, and works at curvets, balotades, croupades, and caprioles It will be necessary, when a horse has the beginning, or first steps of raised airs, and affects a high manage, to encourage this disposition by gentle means, rather than by forcing him to do too much at first, for these high airs are apt to make a horse angry, and very much baulk and dishearten him, when he is too much pressed to them and before you attempt to leap him, care should be taken to have his shoulders well suppled See PESATE, and LEAPING

To AIR *v a* (from the noun) 1 To expose or open to the air (*Dryden*) 2 To give enjoyment of the air (*Addison*)

AIRA (*αιρω*, from *αιρω*, *to take away*) Darnel so named from its being a weed that requires removal

AIRA Hair grass A genus of the class and order triandria digynia Its calyx two-valved, two-flowered, corol two-valved, florets without an imperfect one between them There are seventeen species of this grass, of which some are awned, and others awnless of the first, five species are found on the heaths, meadows, sandy pastures, or sea coasts of our own country, and of the last, two only are natives of Britain, and grow wild in our pasture-lands

AIR-BALLOONS, a general name given to bags of any light substance filled with inflammable air, or other permanently elastic fluid, whose specific gravity is considerably less than that of common atmospheric air See AEROSTATION

AIR BLADDER, a kind of vesicula found in the bodies of fish, and denominated " the Sound, by means whereof they are enabled to sustain themselves in any depth of water, and either to rise or sink at pleasure The air-bladder is the same with what is otherwise called the swimming-bladder it lies close to the back-bone, and has a pretty strong muscular coat whereby it can contract itself By contracting this bag, and condensing the air within it, fish can make their bodies specifically heavier than water, and so readily fall to the bottom, whereas the muscular fibres ceasing to act, the air is again dilated, and they become specifically lighter than water, and so swim above According to the different degrees of contraction and dilatation of this bladder, they can keep higher or lower in the water at pleasure Hence flounders, soles, rays, skate, and such other fishes as want this sac, are found mostly grovelling at the bottom of the water it is owing to this that dead fishes (unless this membrane has been previously broken) are found swimming on the surface, the muscular fibres then ceasing to act, and with their bellies uppermost, for the back bone cannot yield, and the distended sac is protruded into the abdomen, and the back is consequently heaviest at its upper part according to their posture. There is here placed a glandular substance, containing a good quantity of red blood, and it is very probable that the air contained in the swimming-bladder is derived from this substance From the anterior part of the bag go out two processes or appendices, which, according to the gentlemen of the French academy, terminate in their fauces In a variety of other fishes we find communications with some parts of the alimentary canal, particularly the œsophagus and stomach The salmon has an opening from the fore end of the air-bag into the œsophagus, which is surrounded by a kind of muscular fibres The herring has a funnel-like passage leading from the bottom of the stomach into the air-bag, but it is not determined whether the air enters the air-bag by this opening, or comes out by it the latter, however, seems to be the more probable opinion, as the glandular body is found in all fishes, whereas there are several without this passage of communication

The ancients were of opinion, that the air-bladder in fishes served for some purposes essentially necessary to life and Dr Priestley conjectured, that the raising or depressing the fish is not the only use of these air-bladders, but that they also may serve some other purposes in the economy of fishes There are many arguments indeed to be used on this side of the question the most conclusive of which is, that all the cartilaginous kind of fishes want air-bladders, and yet they rise to the top or sink to the bottom of the water without any difficulty, and though most of the eel-kind have air bladders, yet they cannot raise themselves in the water without great difficulty

AIR-BLADDERS, or AIR-BAGS, in ornithology, are cells or receptacles of air in the bodies of birds, which communicate with the lungs, and which are lodged both among the fleshy parts, and in the hollow bones of these animals Mr John Hunter informs us, that the air cells which are found in the soft parts of birds, have no communication with the cavity of the common cellular membrane of the body, some of them communicate immediately with one another, and all of them may be said to have a communication together, by means of the lungs as a common centre Some of them are placed in larger cavities, such as the abdomen, others are so lodged in the interstices of parts, that they would, at first, appear to be the common connecting membrane, as about the breast, axilla, &c The bones which receive air, are of two kinds some, as the sternum, ribs, and vertebræ, have their internal substance divided into innumerable cells, whilst others as the os humeri, and the os femoris, are hollowed out into one large canal The conjectures respecting the use of these cavities are very various, but we cannot give them in detail here The inquisitive reader may consult Hunter, in Phil Trans vol lxiv p 205, &c Dr Latham, in Linnéan Trans vol iv p 94, &c

AIRBUILT *a* (from *air* and *built*) Built in the air (*Pope*)

AIRDRAWN *a* Painted in air (*Shaks*)

AIRER *s* (from *To air*) He that exposes to the air

AIRE, a shire of Scotland, having its principal town of the same name Aire is 65 miles SW of Edinburgh The county contains 84306 people

AIRE, a district of Artois, in the Netherlands, its capital is also of the same name It lies 27 miles W from Lisle Lat 50 46 N Long. 2 32 E.

AIR-GUN, in pneumatics, is a machine for propelling bullets with great violence, by the sole means of condensed air

The first account we meet with of an air-gun is in the Elemens d Artillerie of David Rivaut, who was preceptor to Louis XIII of France He ascribes the invention to one Marin, a burgher of Lisieux, who presented one to Henry IV

To construct a machine of this kind, it is only necessary to take a strong vessel of any sort, into which the air is to be thrown or condensed by means of a syringe, or otherwise, the more the better, then a valve is suddenly opened, which lets the air escape by a small tube in which a bullet is placed, and which is thus violently forced out before the air

It is evident then, that the effect is produced by virtue of the elastic property of the air, the force of which, as has been shewn in a former article, is directly proportional to its condensation, and therefore the greater quantity that can be forced into the engine, the greater will be the effect Now this effect will be exactly similar to that of a gun charged with powder, and therefore we can easily form a comparison between them for inflamed gunpowder is nothing more than very condensed elastic air so that the two forces are exactly similar Now it is shewn by Mr Robins, in his New Principles of Gunnery, that the fluid of inflamed gun-powder has, at the first moment, a force of elasticity equal to about a 1000 times that of common air, and therefore it is necessary that air should be condensed a 1000 times more than in its natural state, to produce the same effect as gun-powder But then it is to be considered, that the velocities with which equal balls are impelled, are directly proportional to the square roots of the forces, so that if the air in an air-gun be condensed only 10 times, then the velocity it will project a ball with will be, by that rule, $\frac{1}{10}$th of that arising from gun-powder, and if the air were condensed 20 times, it would communicate a velocity of $\frac{1}{7}$ of that of gun powder But in reality the air-gun shoots its ball with a much greater proportion of velocity than as above, and for this reason, that as the reservoir, or magazine of condensed air, is commonly very large in proportion to the tube which contains the ball, its density is very little altered by expanding through that narrow tube, and consequently the ball is urged all the way by nearly the same uniform force as at the first instant, whereas the elastic fluid arising from inflamed gun-powder is but very small in proportion to the tube or barrel of the gun, occupying at first, indeed, but a very small portion of it next the but-end, and therefore, by dilating into a comparatively large space, as it urges the ball along the barrel, its elastic force is proportionally weakened, and it acts always less and less on the ball in the tube From which cause it happens that air condensed into a good large machine only 10 times, will shoot its ball with a velocity little inferior to that given by the gun powder And if the valve of communication be suddenly shut again by a spring, after opening it to let some air escape, then the same collection of it may serve to impel many balls, one after another The common air-gun is made of brass, and has two barrels, the inside barrel A, (pl 8 fig 1) which is of a small bore, from whence the bullets are exploded, and a large barrel ECDR on the outside of it There is a syringe SMP fixed in the stock of the gun, by which the air is injected into the cavity between the two barrels through the valve EP The ball K is put down into its place in the small barrel, with the rammer, as in any other gun At SL is another valve, which, being opened by the trigger O, permits the air to come behind the bullet, so as to drive it forwards If this valve be opened and shut suddenly, one charge of condensed air may be sufficient for several discharges of bullets, but if the whole air be discharged on one single bullet, it will drive it out with a greater force This discharge is effected by means of a lock placed as in other guns, for the trigger being pulled, the cock will go down and drive the lever O, fig 1 which will open the valve, and let in the air, upon the bullet K

Air-guns of late years have been much improved in their construction Fig 2 represents one made by the late Mr B Martin which, for simplicity and perfection, exceeds all others A is the barrel, with the lock, stock, ram-rod, &c of the size and weight of a common fowling-piece Under the lock at l, is a round steel tube, having a small moveable pin in the inside, which is pushed out when the trigger a is pulled, by the spring work within the lock, to this tube b, a hollow copper ball c screws, perfectly air tight This copper ball is fully charged with condensed air by the syringe B (fig 3) previous to its being applied to the tube b of fig 2 It is then evident, that if a bullet be rammed down in the barrel, the copper ball screwed fast at b, and the trigger a be pulled, that the pin in b will by the action of the spring-work within the lock, forcibly strike out into the copper ball and thereby pushing in suddenly a valve within the copper ball, let out a portion of the condensed air, which air will rush up through the aperture of the lock and forcibly act against the bullet, driving it to the distance of 60 or 70 yards, or further If the air be strongly condensed, at every discharge only a portion of the air escapes from the ball, therefore, by re-cocking the piece, another discharge may be made, and this repeated to the amount of 15 or 16 times An additional barrel is sometimes made, and applied for the discharge of shot, instead of the one above described

The air in the copper ball is condensed by means of the syringe B (fig 3), in the following manner The ball c is screwed quite close on the top of the syringe At the end of the steel-pointed rod a, is a stout ring, through which passes the rod k upon this rod the feet should be firmly set, then the hands are to be applied to the two handles n, fixed on the side of the barrel of the syringe Now by moving the barrel B steadily up and down on the rod a, the ball c will become charged with condensed air, and it may be easily known when the ball is as full as possible, by the irresistible action that the air makes against the piston when you are working the syringe At the end of the rod k is usually a four square hole, which with the rod serves as a key to fasten the ball c fast on the screw b of the gun and syringe close to the orifice in the ball c In the inside is fixed a valve and spring, which gives way for the admission of air, but upon its emission comes close up to the orifice, shutting up the internal air The piston-rod works air tight, by a collar of leather on it, in in the barrel B, it is therefore plain when the barrel is drawn up, the air will rush in at the hole h When the barrel is pushed down, the air therein contained will have no other way to pass from the pressure of the piston but into the ball c at top, the barrel being drawn up, the operation is repeated, until the condensation is so strong as to resist the action of the piston

Sometimes the syringe is applied to the end of the barrel C (see fig 4), the lock and trigger shut up in a brass case d, and the trigger pulled, or discharge made, by pulling the chain l In this contrivance there is a round chamber for the condensed air at the end of the syringe at e, and it has a valve acting in a similar manner to that of the copper ball When this instrument is not in use, the brass case d is made to slide off and the instrument then becomes a walking stick, from which circumstance and the barrel being made of cane, brass &c it has received the appellation of the Air-cane The head of the cane unscrews and takes off at a where the extremity of the piston-rod in the barrel is shown an iron rod is placed in a ring at the end of this, and the air condensed in the barrel in a similar manner to that of the gun as above; but its force of action is not near so strong and permanent as that of the latter

The Magazine Air-gun was invented upon the same principle as the foregoing, by that ingenious artist L Colbe By this contrivance ten bullets are so lodged in a cavity, near the place of discharge, that they may be drawn into the shooting-barrel, and successively discharged so fast as to be nearly of the same use as so many different guns See Desaguliers Phil vol ii p 399

AIR-HOLE s a hole to admit the air

AIR-JACKET a sort of jacket made of leather, in which are several bags of bladders, composed of the same materials, and communicating with each other By the help of these bladders, which are placed near the breast, the wearer is supported in any water, without making an effort to swim

AIRI, Airima, or Aipihoza, (Indian,) the cassada, a poisonous Indian root

A'IRINESS s (from airy) 1 Exposure to the air, openness 2 Lightness, gayety, levity (*Felton*)

A'IRING s (from air) A short journey to take the air (*Addison*)

Airing of horses, a part of the manage highly advantageous to them in several respects, first, if the air be pure, it purifies the blood, and purges the body from many gross humours, and so inures the creature to exercise and fatigue, that he is seldom hurt by either, when properly taken care of Secondly, it teaches him to let his wind rate equally, or keep time with the other motions of his body Thirdly, it excites an appetite, without which neither gallopers nor hunters will be able to perform their respective offices, with ease to themselves, or satisfaction to their owners

The best time for airing such horses as are too fat is said by some to be before sun rising and after its setting, while others are of a contrary opinion, and assert that the coldness of the air at these times is too great for the animal to be exposed to, particularly if he be subject to rheums, catarrhs, or other similar complaints, which dews and cold fogs are well known to increase Let him not be brought out then till the sun has risen, when the air will be more mild and temperate, and the exercise rather invigorate than hurt his spirits, and have a greater tendency to increase his bodily strength than to impair or reduce it

Nor will it be found a very difficult matter by these means alone to bring down a horse's fat, that is too high in flesh, and reduce him to a clear, healthy, moderate state of body, for it is but making his airings longer, and his exercise a little more severe, which will soon reduce him to a perfect wind and true courage See Exercise

AIRLESS a (from air) Wanting communication with the free air (*Shakspeare*)

AIRLING s (from air) A young, light, gay person (*Ben Johnson*)

AIR-PIPES, an invention for drawing foul air out of ships, or any other cold places, by means of fire These pipes were first discovered by a Mr Sutton, a brewer in London, and from him have got the name of Sutton's Air pipes The principle on which their operation depends is no other than that air is necessary for the support of fire, and, if it have not access from the places most adjacent, will not fail to come from those that are more remote Thus, in a common furnace, the air enters through the ash-hole, but if this be closed up, and a hole made in the side of a furnace, the air will rush in with great violence through that hole If a tube of any length whatever be inserted in this hole the air will rush through the tube into the fire, and of consequence there will be a continued circula-

tion of air in that place where the extremity of the tube is laid. Mr Sutton's contrivance then amounts to this: As, in every ship of any bulk, there is already provided a copper or boiling-place proportionable to the size of the vessel; it is proposed to clear the bad air by means of the fire already used under the coppers or boiling-places for the necessary uses of the ship. It is well known, that, under every such copper or boiler, there are placed two holes, separated by a grate; the first of which is for the fire, and the other for the ashes falling from it, and that there is also a flue from the fire-place upward, by which the smoke of the fire is discharged at some convenient place of the ship. It is also well known, that the fire once lighted in these fire-places is only preserved by the constant draught of air through these two holes and flue, and that if the holes are closely stopped up, the fire, though burning ever so briskly before, is immediately put out. But if, after shutting up these holes, another hole is opened, communicating with any other room or any place, and with the fire, it is clear the fire must burn as before, there being a like draught of air through it as there was before the stopping up of the first holes. It is therefore proposed that, in order to clear the holds of ships of the bad air contained in them, the two holes above-mentioned, the fire place and ash-place, be both closed up with substantial and tight iron doors; and a copper or leaden pipe, of sufficient size, be laid from the hold into the ash-place, for the draught of air to come in that way to feed the fire. And thus it seems plain, from what has been already said, that there will be, from the hold, a constant discharge of the air, and consequently that air, so discharged, must be as constantly supplied by fresh air down the hatches, or such other communications as are opened into the hold. And if into this principal pipe so laid into the hold other pipes are let in, communicating respectively either with the well or lower decks, it must follow, that part of the air consumed in feeding the fire must be respectively drawn out of all such places to which the communication shall be so made.

AIR-PUMP, a machine, by means whereof the air may be exhausted out of proper vessels. The use and effect of the air pump is, to make, what we popularly call, a vacuum; but this, in reality, is only a degree of rarefaction sufficient to suspend the ordinary effects of the atmosphere. By this machine, therefore, we learn, in some measure, what our earth would be without an atmosphere, and how much all vital, generative, nutritive, and alterative power depend upon it.

The principle on which the air-pump is constructed, is the elasticity of the air, as that on which the common, or water pump is founded, is the gravity of the same air. The structure of the air-pump is, in itself more simple even than that of the water pump.—The latter supposes two principles, gravity and elasticity likewise; so that the water-pump must first be an air-pump, i. e. it must rarefy the air before it can raise the water.—In effect, water, being a dormant unelastic fluid, needs some external agent to make it ascend: whereas air ascends in virtue of its own elastic activity: its natural tendency is, to separate, and leave a vacuum, and all that remains for art, is to prevent the ambient air from supplying the place of that which thus spontaneously flies away. The invention of this noble instrument, to which the present age is indebted for so many fine discoveries, is ascribed to Otto de Guericke, the celebrated consul of Magdeburg, who exhibited his first public experiments therewith before the emperor and the states of Germany, at the breaking up of the imperial diet at Ratisbon, in the year 1654.

Guericke, indifferent about the solitary possession of an invention which gave entertainment to numbers who came to see his wonderful experiments, gave a minute description of all his pneumatic apparatus to Gaspar Schottus, professor of mathematics at Wirtemberg, who published it with the author's consent, with an account of some of his performances, first in 1657, in his Mechanica Hydraulico-pneumatica; and then in his Technica Curiosa, in 1664; a curious collection of all the wonderful performances of art which he collected by a correspondence over all Europe.

Otto Guericke's air-pump consists of a glass receiver A (fig. 2. pl. 10.) of a form nearly spherical, fitted up with a brass cap and cock B. The nozzle of the cap was fixed to a syringe C D, also of brass, bent at D into half a right angle. This had a valve at D, opening from the receiver into the syringe, and shutting when pressed in the opposite direction. In the upper side of the syringe there is another valve F, opening from the syringe into the external air, and shutting when pressed inwards. The piston had no valve. The syringe, the cock B, and the joint of the tube, were immersed in a cistern filled with water. From this description it is easy to understand the operation of the instrument. When the piston was drawn up from the bottom of the syringe, the valve F was kept shut, by the pressure of the external air, and the valve D opened by the elasticity of the air in the receiver. When it was pushed down again, the valve D immediately shut by the superior elasticity of the air in the syringe; and when this was sufficiently compressed, it opened the valve F, and was discharged. It was immersed in water, that no air might find its way through the joints or cocks.

It would seem that this machine was not very perfect, for Guericke says that it took several hours to produce an evacuation of a moderate sized vessel; but he says, that when it was in good order, the rarefaction (for he acknowledges that it was not, nor could be, a complete evacuation) was so great, that when the cock was opened, and water admitted, it filled the receiver so as sometimes to leave no more than the bulk of a pea filled with air.

This is a little surprising, for, if the valve F be placed as far from the bottom of the syringe as in Schottus's figure, it would appear that the rarefaction could not be greater than what must arise from the air in DF expanding till it filled the whole syringe because, as soon as the piston in its descent passes F it can discharge no more air, but must compress it between F and the bottom, to be expanded again when the piston is drawn up It is probable that the piston was not very tight, but that on pressing it down it allowed the air to pass it, and the water in which the whole was immersed prevented the return of the air when it was drawn up again and thus accounts for the great time necessary for producing the desired rarefaction

Guericke, being a gentleman of fortune, spared no expence, and added a part to the machine, which saved his numerous visitants the trouble of hours attendance before they could see the curious experiments with the rarefied air He made a large copper vessel G (fig 3), having a pipe and cock below, which passed through the floor of the chamber into an under apartment, where it was joined to the syringe immersed in the cistern of water, and worked by a lever The upper part of the vessel terminated in a pipe, furnished with a stop-cock H, surrounded with a small brim to hold water for preventing the ingress of air On the top was another cap I, also filled with water, to protect the junction of the pipes with the receiver K This great vessel was always kept exhausted, and workmen attended below When experiments were to be performed in the receiver K, it was set on the top of the great vessel, and the cock H was opened The air in K immediately diffused itself equally between the two vessels, and was so much more rarefied as the receiver K was smaller than the vessel G When this rarefaction was not sufficient, the attendants below immediately worked the pump

These particulars deserve to be recorded, as they show the inventive genius of this celebrated philosopher, and because they are useful even in the present advanced state of the study Guericke's method of excluding air from all the joints of his apparatus, by immersing these joints in water, is the only method that has to this day been found effectual, and there frequently occur experiments where this exclusion for a long time is absolutely necessary In such cases it is necessary to construct little cups or cisterns at every joint, and to fill them with water or oil In a letter to Schottus, 1662-3, he describes very ingenious contrivances for producing complete rarefaction, after the elasticity of the remaining air has been so far diminished that it is not able to open the valves He opens the exhausting valves by a plug, which is pushed in by the hand, and the discharging valve is opened by a small pump placed on its outside, so that it opens into a void instead of opening against the pressure of the atmosphere (See Schotti Technica Curiosa, p 68 70) These contrivances have been lately added to air-pumps by Haas and Hurter as new inventions

Guericke's object was not solely to procure a vessel void of air, but to exhaust the air which was already in it: and his principle was the power which he suspected to be in air of expanding itself into a greater space when the force was removed which he supposed to compress it He expressly says (Tract de Experimentis Magdeburgicis, et in Epist ad Schottum,) that the contrivance occurred to him accidentally when occupied with experiments on the Torricellian tube, in which he found that the air would really expand, and completely fill a much larger space than what it usually occupied, and that he had found no limits to the expansion, evincing this by facts which we shall perfectly understand by and by This was a doctrine quite new, and required a philosophical mind to view it in a general and systematic manner, and it must be owned that his manner of treating the subject is equally remarkable for ingenuity and for modesty. (Epist ad Schottum)

His doctrine and his machine were soon spread over Europe It was the age of literary ardour and philosophical curiosity, and it is most pleasant to us, who, standing on the shoulders of our predecessors, can see far around us, to observe the eagerness with which every new, and to us frivolous, experiment was repeated and canvassed The worshippers of Aristotle were daily receiving severe mortifications from the experimenters, or empirics as they affected to call them, and they exerted themselves strenuously in support of his now tottering cause This contributed to the rapid propagation of every discovery, and it was a most profitable and respectable business to go through the chief cities of Germany and France exhibiting philosophical experiments

About this time the foundations of the Royal Society of London were laid Mr Boyle, Mr Wren, lord Brounker, Dr Wallis, and other curious gentlemen, held meetings at Oxford, in which were received accounts of whatever was doing in the study of nature, and many experiments were exhibited The researches of Galileo, Torricelli, and Pascal, concerning the pressure of the air, greatly engaged their attention, and many additions were made to their discoveries Mr Boyle, the most ardent and successful studier of nature, had the principal share in these improvements, his inquisitive mind being aided by an opulent fortune In a letter to his nephew lord Dungarvon, he says that he had made many attempts to see the appearances exhibited by bodies freed from the pressure of the air He had made Torricellian tubes, having a small vessel a-top, into which he put some bodies before filling the tubes with mercury, so that when the tube was set upright, and the mercury run out, the bodies were in vacuo He had also abstracted the water from a vessel, by a small pump, by means of its weight, having previously put bodies into the vessel along with the water. But all these ways were very trou-

blesome and imperfect He was delighted when he learned from Schottus's first publication, that counsellor Guericke had effected this by the expansive power of the air, and immediately set about constructing a machine from his own ideas, no description of Guericke's being then published

It consisted of a receiver A fig 6 (pl 8), furnished with a stop-cock B, and syringe CD placed in a vertical position below the receiver Its valve C was in its bottom, close adjoining to the entry of the pipe of communication, and the hole by which the air issued was further secured by a plug, which could be removed The piston was moved by a wheel and rack-work The receiver of Guericke's pump was but ill adapted for any considerable variety of experiments, and accordingly very few were made in it Mr Boyle's receiver had a large opening EF, with a strong glass margin To this was fitted a strong brass cap, pierced with a hole G in its middle, to which was fitted a plug ground into it, and shaped like the key of a cock The extremity of this key was furnished with a screw, to which could be affixed a hook, or a variety of pieces for supporting what was to be examined in the receiver, or for producing various motions within it, without admitting the air This was further guarded against by means of oil poured round the key, where it was retained by the hollow cupble form of the cover With all these precautions, however, Mr Boyle ingenuously confesses, that it was but seldom, and with great difficulty, that he could produce an extreme degree of rarefaction, and it appears by Guericke's letter to Schottus, that in this respect the Magdeburgh machine had the advantage But most of Boyle's very interesting experiments did not require this extreme rarefaction, and the variety of them, and their philosophic importance, compensated for this defect, and soon eclipsed the fame of the inventor to such a degree, that the state of air in the receiver was generally denominated the vacuum Boyleanum, and the air-pump was called machina Boyleana It does not appear that Guericke was at all solicitous to maintain his claim to priority of invention He seems to have been of a truly noble and philosophical mind, aiming at nothing but the advancement of science

Mr Boyle found, that to make a vessel airtight it was sufficient to place a piece of wet or oiled leather on its brim, and to lay a flat plate of metal upon this The pressure of the external air squeezed the two solid bodies so hard together, that the soft leather effectually excluded it This enabled him to render the whole machine incomparably more convenient for a variety of experiments He caused the conduit-pipe to terminate in a flat plate which he covered with leather and on this he set the glass ball or receiver, which had both its upper and lower brim ground flat He covered the upper orifice in like manner with a piece of oiled leather and a flat plate, having cocks and a variety of other perforations and contrivances suited to his purposes This he found infinitely more expeditious, and also tighter, than the clammy cements which he had formerly used for securing the joints

He was now assisted by Dr Hooke, probably the most ingenious and inventive mechanic that the world has ever seen This person made a great improvement on the air-pump, by applying two syringes whose piston rods were worked by the same wheel, and putting valves in the pistons in the same manner as in the piston of a common pump This evidently doubled the expedition of the pump's operation, and greatly diminished the labour of pumping

This is therefore the form of the air-pump which is most generally used all over Europe. Some traces of national prepossession remain In Germany, air pumps are frequently made after the original model of Guericke's (Wolf Cyclomathesis), and the French generally use the pump made by Papin, though extremely awkward We shall give a description of Boyle's air-pump as finally improved by Hawksbee, which, with some small accommodations to particular views, still remains the most approved form

Here follows the description from Desaguliers

It consists of two brass barrels *a a*, *a a* (pl 8 fig 5), 12 inches high and 2 wide The pistons are raised and depressed by turning the winch *b b* This is fastened to an axis passing through a strong toothed wheel, which lays hold of the teeth of the racks *c c c c* Then the one is raised while the other is depressed, by which means the valves, which are made of limber bladder, fixed in the upper part of each piston, as well as in the openings into the bottom of the barrels, perform their office of discharging the air from the barrels, and admitting into them the air from the receiver to be afterwards discharged, and when the receiver comes to be pretty well exhausted of its air, the pressure of the atmosphere in the descending piston is nearly so great, that the power required to raise the other is little more than is necessary for overcoming the friction of the piston, which renders this pump preferable to all others, which require more force to work them as the rarefaction of the air in the receiver advances

The barrels are set in a brass dish about two inches deep, filled with water or oil to prevent the insinuation of air The barrels are screwed tight down by the nuts *e e*, *e e*, which force the frontispiece *f f* down on them, through which the two pillars *g g*, *g g* pass

From between the barrels rises a slender brass pipe *h h*, communicating with each by a perforation in the transverse piece of brass on which they stand The upper end of this pipe communicates with another perforated piece of brass, which screws underneath the plate *i i i i*, of ten inches diameter, and surrounded with a brass rim to prevent the shedding of water used in some experiments This piece of brass has three branches 1st, A horizontal

one communicating with the conduit pipe *h h* 2 An upright one screwed into the middle of the pump-plate, and terminating in a small pipe *k*, rising about an inch above it 3d, Is a perpendicular one, looking downwards in the continuation of the pipe *k*, and having a hollow screw in its end receiving the brass cap of the gage pipe *l l l l*, which is of glass, 34 inches long, and immersed in a glass cistern *m n* filled with mercury This is covered a-top with a cork float, carrying the weight of a light wooden scale divided into inches, which are numbered from the surface of the mercury in the cistern This scale will therefore rise and fall with the mercury in the cistern, and indicate the true elevation of that in the tube

There is a stop-cock immediately above the insertion of the gage pipe, by which its communication may be cut off There is another at *n*, by which a communication is opened with the external air for allowing its readmission, and there is sometimes another immediately within the insertion of the conduct-pipe for cutting off the communication between the receiver and the pump This is particularly useful when the rarefaction is to be continued long, as there are by these means fewer chances of the insinuation of air by the many joints

The receivers are made tight by simply setting them on the pump plate with a piece of wet or oiled leather between, and the receivers, which are open a-top, have a brass cover set on them in the same manner In these covers there are various perforations and contrivances for various purposes The one in the figure has a slip wire passing through a collar of oiled leather, having a hook or a screw in its lower end for hanging any thing on, or producing a variety of motions

Sometimes the receivers are set on another plate, which has a pipe screwed into its middle, furnished with a stop cock and a screw, which fits the middle pipe *k* When the rarefaction has been made in it, the cock is shut, and then the whole may be unscrewed from the pump, and removed to any convenient place This is called a transporter plate

It only remains to explain the gage *l l l l* In the ordinary state of the air its elasticity balances the pressure of the incumbent atmosphere We find this from the force that is necessary to squeeze it into less bulk in opposition to this elasticity Therefore the elasticity of the air increases with the vicinity of its particles It is therefore reasonable to expect, that when we allow it to occupy more room, and its particles are further asunder, its elasticity will be diminished, though not annihilated, that is, it will no longer balance the *whole* pressure of the atmosphere, though it may still balance part of it If therefore an upright pipe have its lower end immersed in a vessel of mercury, and communicate by its upper end with a vessel containing rarefied, therefore less elastic, air, we should expect that the pressure of the air will prevail, and force the mercury into the tube, and cause it to rise to such a height that the weight of the mercury, joined to the elasticity of the rarefied air acting on its upper surface, shall be exactly equal to the whole pressure of the atmosphere The height of the mercury is the exact measure of that part of the whole pressure which is not balanced by the elasticity of the rarefied air, and its deficiency from the height of the mercury in the Torricellian tube is the exact measure of this remaining elasticity

It is evident, therefore, that the pipe will be a scale of the elasticity of the remaining air, and will indicate in some sort the degree of rarefaction for there must be some analogy between the density of the air and its elasticity, and we have no reason to imagine that they do not increase and diminish together, although we may be ignorant of the law, that is, of the change of elasticity corresponding to a known change of density This is to be discovered by experiment, and the air-pump itself furnishes us with the best experiments for this purpose After rarefying till the mercury in the gage has attained half the height of that in the Torricellian tube, shut the communication with the barrels and gage, and admit the water into the receiver It will go in till all is again in equilibrio with the pressure of the atmosphere, that is, till the air in the receiver has collapsed into its natural bulk This we can accurately measure and compare with the whole capacity of the receiver, and thus obtain the precise degree of rarefaction corresponding to half the natural elasticity We can do the same thing with the elasticity reduced to one third, one fourth, &c and thus discover the whole law

Notwithstanding the great excellency of Mr Hawksbee's air pump, it was still subject to inconveniences, from which it was in a great measure relieved by some contrivances of Mr Smeaton, which are described at large in the Philos Trans, for the year 1752 The principal improvements suggested by Mr Smeaton relate to the gage the valves of the piston, and the piston going closer down to the bottom of the barrel, for his pump has only one By the last of these, the air was extracted more perfectly at each stroke By the second he remedied an inconvenience arising from the valve-hole of the piston being too wide properly to support the bladder valve which covered it instead of the usual circular orifice, Mr Smeaton perforated the piston with seven small and equal hexagonal holes, one in the centre, and the other six around, forming together the appearance of a transverse section of a honey-comb, the bars or divisions between which served to support the pressure of the air on the valve His gage consists of a bulb of glass, of a pear-like shape, and capable of holding about half a pound of quicksilver it is open at the lower end, the other terminating in a tube hermetically sealed, and it has annexed to it a scale, divided into parts of about 1-10th of an inch, and answering to the 1000th part of the whole capacity During the exhaustion of the receiver, the gage is suspended in it by a wire,* but when the pump has been worked as much,

as necessary, the gage is pushed down, till the open end be immersed in a bason of quicksilver placed underneath The air is then let into the receiver again, and the quicksilver driven by it from the bason, up into the gage, till the air remaining in it become of the same density as the air without, and as the air always takes the highest place, the tube being uppermost, the expansion will be determined by the number of divisions occupied by the air at the top This air pump is made to act also as a condensing engine, as some German machines had done before, by the very simple apparatus of turning a cock

By means of this gage, Mr Smeaton judged that his machine was incomparably better than any former ones, as it seemed to rarefy the air in the receiver 1000, or even 2000 times, while the best of the former construction only rarefied about 140 times and so the case has since been always understood, an implicit confidence being placed in Mr Smeaton's accuracy, till the fallacy was accidentally detected in the manner related at large by Mr Nairne in the Philos Transac for the year 1777 From this history it appears that a considerable difference always subsisted between the measures of exhaustion furnished by the pear-gage, and the usual long and short tube gages, a difference which was ascribed by the hon Mr Cavendish to moisture Hence, Mr Nairne concluded that, if he were to avoid moisture as much as possible, the two gages should nearly agree And in fact they were found so to do, each shewing a rarefaction of about 600 when all moisture was perfectly cleared away from the pump, and the plate and the edges of the receiver were secured by a cement instead of setting it upon a soaked leather, as in the usual way

A very important improvement is that by Mr Cuthbertson, then of Amsterdam, but now of London, which we shall here describe but must be allowed to observe, beforehand that the same construction was invented, and in part executed, before the end of 1779, by Dr Daniel Rutherford, now professor of botany in the university of Edinburgh, who was at that time engaged in experiments on the production of air during the combustion of bodies in contact with nitre, and who was vastly desirous of procuring a more complete abstraction of pure aerial matter than could be effected by Mr Smeaton's pump The doctor's dissertation on this subject was read in the Philosophical Society of Edinburgh In this dissertation the doctor appears fully apprised of the existence of pure vital air in the nitrous acid as its chief ingredient, and as the cause of its most remarkable phenomena, and to want but a step to the discoveries which have ennobled the name of M Lavoisier He was particularly anxious to obtain apart this distinguishing ingredient in its composition, and, for this purpose, to abstract completely from the vessel in which he subjected it to examination every particle of elastic matter It was proposed to him to cover the bottom of Mr Smeaton's piston with some clammy matter, which should take hold of the bottom valve, and start it when the piston was drawn up Soon after, the doctor shewed a drawing of a pump, having a conical metal valve in the bottom, furnished with a long slender wire, sliding in the inside of the piston-rod with a gentle friction, sufficient for lifting the valve, and secured against all chance of failure by a spring a top, which took hold of a notch in the inside of the piston rod about a quarter of an inch from the lower end, so as certainly to lift the valve during the last quarter of an inch of the piston's motion Being an excellent mechanic, he had executed a valve on this principle, and was fully satisfied with its performance But having already confirmed his doctrines respecting the nitrous acid by incontrovertible experiments, his wishes to improve the air pump lost their incitement and he thought no more of it, and not long after this, the ardour of the philosophers of the Teylerian Society at Haerlem and Amsterdam excited the efforts of Mr Cuthbertson their instrument-maker, to the same purpose, and produced one of the most perfect air-pumps that has yet appeared We shall give a description of it, and an account of its performance, in the inventor's own words

Cuthbertson's Air Pump —In pl 10 is a perspective view of this pump, with its two principal gages screwed into their places These need not be used together, except in cases where the utmost exactness is required In common experiments one of them is removed, and a stop-screw put in its place When the pear-gage is used, a small round plate, on which the receiver may stand, must be first screwed into the hole at A, but this hole is stopped on other occasions with a screw When all the three gages are used, and the receiver is exhausted, the stop screw B, at the bottom of the pump, must be unscrewed, to admit the air into the receiver, but when they are not all used, either of the other stop screws will answer this purpose

A cross-bar for preventing the barrels from being shaken by working the pump or by any accident, is represented by the dotted lines It is confined in its place, and kept close down on the barrels by two slips of wood NN, which must be drawn out, as well as the screws OO, when the pump is to be taken asunder

Plate 9 is a section of all the working parts of the pump, except the wheel and rack, in which there is nothing uncommon

Fig 1 is a section of one of the barrels, with all its internal parts, and fig 2, 3, 4, and 5, are different parts of the piston proportioned to the size of the barrel * and to one another

In fig 1 CD represents the barrel, F the collar of leathers, G a hollow cylindrical vessel to contain oil R is also an oil-vessel to re-

* The piston and barrel are 1 65 inches in diameter, in proportion to which the scale is drawn Figures 2, 3, 4, and 5, are, however, of double size

ceive the oil which is drawn, along with the air, through the hole $a\,a$, when the piston is drawn upwards, and, when this is full, the oil is carried over with the air, along the tube T, into the oil-vessel G. $c\,c$ is a wire which is driven upwards from the hole $a\,a$ by the passage of the air, and as soon as this has escaped, it falls down again by its own weight, shuts up the hole, and prevents all return of the air into the barrel. At $d\,d$ are fixed two pieces of brass, to keep the wire $c\,c$ in a vertical direction, that it may accurately shut the hole. H is a cylindrical wire or rod which carries the piston I, and is made hollow to receive a long wire $g\,g$, which opens and shuts the hole L, and on the other end of the wire O is screwed a nut, which, by stopping in the narrowest part of the hole, prevents the wire from being driven up too far. This wire and screw are more clearly seen in fig. 2. and 6., they slide in a collar of leather $r\,r$, fig. 2. and 5. in the middle piece of the piston. Fig. 4. and 5. are the two mean parts which compose the piston, and when the pieces 3. and 6. are added to it, the whole is represented by fig. 2. Fig. 5. is a piece of brass of a conical form, with a shoulder at the bottom. A long hollow screw is cut in it, about ¾ of its length, and the remainder of the hole, in which there is no screw, is of about the same diameter with the screwed part, except a thin plate at the end which is of a width exactly equal to the thickness of $g\,g$. That part of the inside of the conical brass in which no thread is cut, is filled with oiled leathers with holes through which $g\,g$ can slide stiffly. There is also a male screw with a hole in it, fitted to $g\,g$, serving to compress the leathers $r\,r$. In fig. 4. $a\,a\,a\,a$ is the outside of the piston, the inside of which is turned so as exactly to fit the outside of fig. 5. $b\,b$ are round leathers about 60 in number, $c\,c$ is a circular piece of brass of the size of the leathers, and $d\,d$ is a screw serving to compress them. The screw at the end of fig. 3. is made to fit the screw in fig. 5. Now if fig. 6. be pushed into fig. 5. this into fig. 4. and fig. 3. be screwed into the end of fig. 5. these will compose the whole of the piston, as represented in fig. 2. H in fig. 1. represents the same part as H in fig. 2, and is that to which the rack is fixed. If, therefore, this be drawn upwards, it will cause fig. 5. to shut close into fig. 4. and drive out the air above it, and when it is pushed downward, it will open as far as the shoulder $a\,a$ will permit, and suffer air to pass through. A A fig. 7. is the receiver plate. BB is a long square piece of brass, screwed into the under side of the plate, through which a hole is drilled corresponding to that in the centre of the receiver plate, and with three female screws b, b, c.

The rarefaction of the air in the receiver is effected as follows. Suppose the piston at the bottom of the barrel. The inside of the barrel, from the top of the piston to a, contains common air. When the rod is drawn up, the upper part of the piston sticks fast in the barrel till the conical part connected with the rod shuts the conical hole, and its shoulder applies close to its bottom. The piston is now shut, and therefore the whole is drawn up by the rack-work, driving the air before it through the hole $a\,a$, into the oil vessel at R, and out into the room by the tube T. The piston will then be at the top of the barrel at a, and the wire $g\,g$ will stand nearly as represented in the figure just raised from the hole L, and prevented from rising higher by the nut O. During this motion the air will expand in the receiver, and come along the bent tube m into the barrel. Thus the barrel will be filled with air, which, as the piston rises, will be rarefied in proportion as the capacity of the receiver, pipes, and barrel is to the barrel alone. When the piston is moved down again by the rack-work, it will force the conical part fig. 5. out of the hollow part fig. 4. as far as the shoulders $a\,a$. Fig. 2. will rest on $a\,a$ fig. 4, which will then be so far open as to permit the air to pass freely through it, while at the same time the end of $g\,g$ is forced against the top of the hole, and shuts it, in order to prevent any air from returning into the receiver. Thus, the piston moving downwards suffers the air to pass out between the sides of fig. 4. and 5., and, when it is at the bottom of the barrel, will have the column of air above it: and, consequently, when drawn upwards it will shut, and drive out this air, and, by opening the hole L at the same time, will give a free passage to more air from the receiver. This process being continued, the air of the receiver will be rarefied as far as its expansive power will permit. For in this machine there are no valves to be forced open by the elasticity of the air in the receiver, which at last it is unable to effect. There is therefore nothing to prevent the air from expanding to its utmost degree.

It may be suspected here, that as the air must escape through the discharging passage $a\,c$, fig. 1. against the pressure of a column of oil and the weight of the wire, there will remain in this passage a quantity of air of considerable density, which will expand again into the barrel during the descent of the piston, and thus put a stop to the progress of rarefaction. This is the case in Mr Smeaton's pump, and all which have valves in the piston. But it is the peculiar excellency of this pump, that whatever be the density of the air remaining in $a\,c$, the rarefaction will still go on. It is worth while to be perfectly convinced of this. Let us suppose that the air contained in $a\,c$ is $\frac{1}{100}$ part of the common air which would fill the barrel, and that the capacity of the barrel is equal to that of the receiver and passages, and that the air in the receiver and barrel is of the same density, the piston being at the bottom of the barrel: the barrel will therefore contain $\frac{1}{1000}$ parts of its natural quantity, and the receiver $\frac{1}{1000}$. Now let the piston be drawn up. No air will be discharged at $a\,c$, because it will contain the whole air which was in the barrel, and which has now collapsed into its ordinary bulk. But this does not in the least hinder the air of the receiver from expanding into the

barrel, and diffusing itself equally between both. Each will now contain $\frac{5}{1000}$ of their ordinary quantity when the piston is at the top, and $a\,c$ will contain $\frac{1}{100}$ as before, or $\frac{10}{1000}$. Now push down the piston. The hole L is instantly shut, and the air in $a\,c$ expands into the barrel, and the barrel now contains $\frac{15}{1000}$. When the piston has reached the bottom, let it be again drawn up. There will be $\frac{5}{1000}$ discharged through c, and the air in the receiver will again be equally distributed between it and the barrel. Therefore the receiver will now contain $\frac{2\frac{1}{2}}{1000}$. When the piston reaches the bottom, there will be $\frac{12\frac{1}{2}}{1000}$ in the barrel. When again drawn up to the top, there will be $\frac{2\frac{1}{2}}{1000}$ discharged, and the receiver will contain $\frac{1\frac{1}{4}}{1000}$, and when the piston reaches the bottom there will be $\frac{11\frac{1}{4}}{1000}$. At the next stroke the receiver will contain only $\frac{0\frac{5}{8}}{1000}$, &c. &c.

Thus it appears, that notwithstanding the $\frac{10}{1000}$ which always expands back again out of the hole $a\,c$ into the barrel, the rarity of the air in the receiver will be doubled at every stroke. There is therefore no need of a subsidiary air-pump at c, as in the American air-pump, and in the Swedish attempt to improve Smeaton's.

In using this air-pump no particular directions are necessary, nor is any peculiar care requisite for keeping it in order, except that the oil-vessel A be always kept about half full of oil. When the pump has stood long without being used, it will be proper to draw a table-spoonful of olive-oil through it, by pouring it into the hole in the middle of the receiver-plate when the piston is at the bottom of the barrel. Then, by working the piston, the oil will be drawn through all the parts of the pump, and the surplus will be driven through the tube T into the oil vessel G. Near the top of the piston-rod at H there is a hole which lets some oil into the inside of the rod, which gets at the collar of leathers $r\,r$, and keeps the wire $g\,g$ air-tight.

When the pump is used for condensation at the same time that it rarefies, or separately, the piece containing the bent tube T must be removed, and fig. 8. put into its place, and fixed by its screws. Fig. 8. as drawn in the plate, is intended for a double-barrelled pump. But for a single barrel only one piece is used, represented by $b\,a\,a$, the double piece being cut off at the dotted line $a\,a$. In this piece is a female screw to receive the end of a long brass tube, to which a bladder (if sufficient for the experiment of condensation), or a glass, properly secured for this purpose, must be screwed. Then the air which is abstracted from the receiver on the pump-plate will be forced into the bladder or glass. But if the pump be double, the apparatus fig. 8. is used, and the long brass tube screwed on at c.

Fig. 9. and 10. represent the two gages, which will be sufficiently explained afterwards. Fig. 9. is screwed into $c\,b$, or into the screw at the other end of c fig. 7. and fig. 10. into the screw $a\,b$ fig. 7.

If it be used as a single pump, either to rarefy or condense, the screw K, which fastens the rack to the piston-rod H, must be taken out. Then turning the winch till H is depressed as low as possible, the machine will be fitted to exhaust as a single pump; and if it be required to condense, the direction in No 8. must be observed with regard to the tube T, and fig. 8.

"I took, says Mr Cuthbertson, "two barometer tubes of an equal bore with that fixed to the pump. These were filled with mercury four times boiled. They were then compared, and stood exactly at the same height. The mercury in one of them was boiled in it four times more, without making any change in their height; they were therefore judged very perfect. One of these was immersed in the cistern of the pump-gage and fastened in a position parallel to it, and a sliding scale of one inch was attached to it. This scale, when the gage is used, must have its upper edge set equal with the surface of the mercury in the boiled tube after exhaustion, and the difference between the height of the mercury in this and in the other barometer-tube may be observed to the $\frac{1}{100}$ of an inch, and being close together, no error arises from their not being exactly vertical, if they are only parallel. This gage will be better understood by inspecting fig. 10.

"I used a second gage, which I shall call a double syphon. See fig. 9. This was also prepared with the utmost care. I had a scale for measuring the difference between the height of the columns in the two legs. It was an inch long, and divided as the former, and kept in a truly vertical position, by suspending it from a point with a weight hung to it, as represented in the figure. Upon comparing these two gages, I always found them to indicate the same degree of rarefaction. I also used a pear-gage, though the most imperfect of all, in order to repeat the curious experiments of Mr Nairne and others.

When experiments require the utmost rarefying power of the pump, the receiver must not be placed on leather, either oiled or soaked in water, as is usually done. The pump-plate and the edge of the receiver must be ground very flat and true, and this with very fine emery, that no roughness may remain. The plate of the pump must then be wiped very clean and very dry, and the receiver rubbed with a warm cloth till it become electrical. The receiver being now set on the plate, hog's lard, either alone, or mixed with a little oil which has been cleared of water by boiling, must be smeared round its outside edge. In this condition the pump will rarefy its utmost and what still remains in the receiver will be permanent air. Or a little of this composition may be thinly smeared on the pump-plate; this will prevent all risk of scratching it with the edge of the receiver. Leather of very uniform thickness, long dried before a fire, and

well soaked in this composition, which must be cleared of all water by the first boiling, will answer very well, and is expeditious, when receivers are to be frequently shifted. Other leathers should be at hand soaked in a composition containing a little resin. This gives it a clamminess which renders it impermeable to air and is very proper at all joints of the pump, and all apparatus for pneumatic experiments. As it is impossible to render the pear-gage as dry as other parts of the apparatus, there will be generally some variation between this and the other gages.

When it is only intended to show the utmost power of the pump, without intending to ascertain the quality of the residuum, the receiver may be set on wet leather. If, in this condition, the air be rarefied as far as possible, the syphon and barometer-gage will indicate a less degree of rarefaction than in the former experiments. But when the air is let in again, the pear gage will point out a rarefaction some thousands of times greater than it did before. If the true quality of permanent air after exhaustion be required, the pear gage will be nearest the truth; for, when the air is rarefied to a certain degree, the moistened leather emits an expansible fluid, which, filling the receiver, forces out the permanent air, and the two first gages indicate a degree of exhaustion which relates to the whole elastic matter remaining in the receiver, viz. to the expansible fluid together with the permanent air, whereas the pear gage points out the degree of exhaustion, with relation to the permanent air alone, which remains in the receiver; for, by the pressure of the air admitted into the receiver, the elastic vapour is reduced to its former bulk, which is imperceptible.

Many bodies emit this elastic fluid when the pressure of the air is much diminished; a piece of leather, in its ordinary damp state, about an inch square, or a bit of green or dry wood, will supply this for a great while.

When such fluids have been generated in any experiments, the pump must be carefully cleared of them, for they remain not only in the receiver, but in the barrels and passages, and will again expand when the exhaustion has been carried far.

The best method of clearing the pump is to take a very large receiver, and to use every precaution to exhaust it as far as possible. Then the expansible matter lurking in the barrels and passes will be diffused through the receiver also, or will be carried off along with its air. It will be as much rarer than it was before, as the aggregate capacity of the receiver barrels and passes is larger than that of the two last.

The performance of the pump may be judged of from the four following experiments.

The two gages being screwed into their places, and the hole in the receiver-plate shut up, the pump was made to exhaust as far as it could. The mercury in the legs of the syphon was only $\frac{1}{40}$ of an inch out of the level, and that in the boiled barometer tube $\frac{1}{20}$ of an inch higher than in the one screwed to the pump. A standard barometer then stood at 30 inches, and therefore the pump rarefied the permanent air 1200 times. This is twice as much as Mr. Nairne found Mr Smeaton's do in its best state. Mr Cavallo seems disposed to give a favourable (while we must suppose it a just) account of Haas and Hurter's pump, and it appears never to have exceeded 600 times. Mr Cuthbertson has often found the mercury within $\frac{1}{100}$ of an inch of the level in the syphon gage, indicating a rarefaction of 3000.

To one end of a glass tube, 2 inches diameter and 30 inches long, was fitted a brass cap and collar of leather, through which a wire was inserted, reaching about two inches within the tube. This was connected with the conductor of an electric machine. The other end was ground flat and set on the pump-float. When the gages indicated a rarefaction of 300, the light became steady and uniform, of a pale colour though a little tinged with purple; at 600 the light was of a pale dusky white; when 1200 it disappeared in the middle of the tube, and the tube conducted so well that the prime conductor only gave sparks so faint and short as to be scarcely perceptible. After taking off the tube, and making it as dry as possible, it was again connected with the conductor, which was giving sparks two inches long. When the air in it was rarefied ten times, the sparks were of the same length. Sometimes a pencil of light darted along the tube. When the rarefaction was 20, the spark did not exceed an inch, and light streamed the whole length of the tube. When the rarefaction was 30, the sparks were half an inch, and the light rushed along the tube in great streams. When the rarefaction was 100, the sparks were about $\frac{1}{4}$ long, and the light filled the tube in an uninterrupted body. When 300, the appearances were as before. When 600, the sparks were $\frac{1}{10}$, and the light was of a faint white colour in the middle, but tinged with purple toward the ends. When 1200, the light was hardly perceptible, and was much fainter at the ends than before, but still ruddy. When 1400, which was the most the pump could produce, six inches of the middle of the tube were quite dark, and the ends free of any tinge of red, and the sparks did not exceed $\frac{1}{40}$ of an inch.

Many other ingenious attempts have been made during the last ten years to improve the mechanism of the air pump, to describe a fourth part of which would lead us far beyond our limits. Justice, however, to the authors of these improvements, as well as a desire to gratify the reader, induces us to refer to Nicholson's Journal, vols. i. and ii. 4to. for descriptions of the pumps invented by Messrs Prince, Sadler, Little, sir G. Mackenzie, &c.; to the Retrospect of Philosophical Discoveries, vol. ii., for accounts of the simple inventions of Wright and Silvester; and to Mr Professor Vince's Hydrostatics, for an account of the air-pump used by that gentleman in his lectures.

We beg to be indulged in one remark, that, although this noble instrument originated in Germany, all its improvements were made in

this kingdom Both the mechanical and pneumatical principles of Mr Boyle's construction were extremely different from the German, and in respect of expedition and convenience much superior The double barrel and gage by Hauksbee were capital improvements, and on principle Mr Smeaton's method of making the piston work in rarefied air made a complete change in the whole process and the improvements of Rutherford (essentially the same as Cuthbertson's), Mackenzie, and others just named, have now left us little to expect from any farther attempts

The Use and Effect of the Air Pump—In whatever manner or form this machine is made, its use and operation are much the same By means of the motion of the handle, a barrel of the contained air is drawn out at every stroke of the piston, in the following manner by pushing the piston down to the bottom of the barrel, where the air is prevented from escaping downwards, by its elasticity it opens the valve of the piston and escapes upwards above it into the open air, then raising the piston up, the external atmosphere shuts down its valve and a vacuum would be made below it but for the air in the receiver, pipe, &c, which now rushes through the valve in the bottom of the barrel, and rushes in and fills it again, till the whole air in the receiver and barrel be of one uniform density but less than it was before the stroke in proportion as the sum of all the capacities of the receiver, pipe and barrel together is to the same sum wanting the barrel And thus is the air in the receiver diminished at each stroke of the piston by the quantity of the barrel or cylinder full and therefore always in the same proportion so that by thus repeating the operation again and again, the air is rarefied to any proposed degree or till it has not elasticity enough to open the valve of the piston or of the barrel, after which the exhaustion cannot be any farther carried on the gauge in comparison with the barometer shewing at any time what the degree of exhaustion is according to the particular nature and construction of it

But, supposing no vapour from moisture, &c to rise in the receiver, the degree of exhaustion after any number of strokes of the piston, may be determined by knowing the respective capacities of the barrel and the receiver, including the pipe, &c For as we have seen above that every stroke diminishes the density in a constant proportion, namely, as much as the whole content exceeds that of the cylinder or barrel, and consequently the sum of as many diminutions as there are strokes of the piston, will shew the whole diminution by all the strokes So, if the capacity of the barrel be equal to that of the receiver, in which the communication pipe is always to be included then, the barrel being half the sum of the whole contents, half the air will be drawn out at one stroke, and consequently the remaining half, being diluted through the whole or first capacity, will be of only half the density of the first in like manner, after the second stroke, the density of the remaining contents will be only half of that after the first stroke, that is only $\frac{1}{4}$ of the original density continuing this operation, it follows that the density of the remaining air will be $\frac{1}{8}$ after 3 strokes of the piston, $\frac{1}{16}$ after 4 strokes, $\frac{1}{32}$ after 5 strokes and so on, according to the powers of the ratio $\frac{1}{2}$ that is such power of the ratio as is denoted by the number of the strokes In like manner if the barrel be $\frac{1}{3}$ of the whole content, that is, the receiver double of the barrel or $\frac{2}{3}$ of the whole contents then the ratio of diminution of density being $\frac{2}{3}$, the density of the contents, after any number of strokes of the piston, will be denoted by such power of $\frac{2}{3}$ whose exponent is that number; namely, the density will be $\frac{2}{3}$ after one stroke, $(\frac{2}{3})^2$ or $\frac{4}{9}$ after two strokes $(\frac{2}{3})^3$ or $\frac{8}{27}$ after 3 strokes, and in general it will be $(\frac{2}{3})^n$ after n strokes the original density of the air being 1 Hence then universally, if s denote the sum of the contents of the receiver and barrel, and r that of the receiver only without the barrel, and n any number of strokes of the piston, then, the original density of the air being 1, the density after n strokes will be $(\frac{r}{s})^n$ or $\frac{r^n}{s^n}$, namely the n power of the ratio $\frac{r}{s}$ So, for example, if the capacity of the receiver be equal to 4 times that of the barrel, then their sum s is 5, and r is 4, and the density of the contents after 30 strokes will be $(\frac{4}{5})^{30}$, or the 30th power of $\frac{4}{5}$ which is $\frac{1}{808}$ nearly, so that the air in the receiver is rarefied 808 times

See also the Memoires de l'Acad Roy de des Sciences for the years 1693 and 1705

From the same formula namely $(\frac{r}{s})^n = d$ the density, we easily derive a rule for finding the number of strokes of the piston necessary to rarefy the air any number of times, or to reduce it to a given density d part of the natural air being 1 For since $(\frac{r}{s})^n = d$, by taking the logarithm of this equation, it is $n \times \log \frac{r}{s} = \log$ of d, and hence $n = \frac{\log d}{\log r - \log s}$ that is, divide the log of the proposed density by the log of the ratio of the receiver to the sum of the receiver and barrel together, and the quotient will shew the number of strokes of the piston requisite to produce the degree of exhaustion required So, for example, if the receiver be equal to 5 times the barrel, and it be proposed to find how many strokes of the piston will rarefy the air 100 times, then $r = 5$, $s = 6$, $d = \frac{1}{100}$, whose log -2, and $\frac{r}{s} = \frac{5}{6}$ whose log is $-.07918$, therefore $\frac{-2}{-.07918} = 25\frac{1}{4}$ nearly, which is the number of strokes required

Some of the principal effects and phænomena of the air pump are the following That,

in the exhausted receiver, heavy and light bodies fall equally swift, so, a guinea and feather fall from the top of a tall receiver to the bottom exactly together That most animals die in a minute or two but, however, that vipers and frogs, though they swell much, live an hour or two, and after being seemingly quite dead, come to life again in the open air that snails survive about ten hours efts, or slow-worms, two or three days, and leeches five or six That oysters live for 24 hours That the heart of an eel taken out of the body continues to beat for good part of an hour, and that more briskly than in the air That warm blood, milk, gall, &c undergo a considerable intumescence and ebullition That a mouse or other animal may be brought, by degrees, to survive longer in a rarefied air, than naturally it does That air may retain its usual pressure, after it is become unfit for respiration That the eggs of silk-worms hatch in vacuo That vegetation stops That fire extinguishes, the flame of a candle usually going out in one minute, and a charcoal in about five minutes That red-hot iron, however, seems not to be affected, and yet sulphur or gunpowder are not lighted by it, but only fused That a match, after lying seemingly extinct a long time, revives again on readmitting the air That a flint and steel strike sparks of fire as copiously, and in all directions, as in air That magnets, and magnetic needles, act the same as in air That the smoke of an extinguished luminary gradually settles to the bottom in a darkish body, leaving the upper part of the receiver clear and transparent, and that on inclining the vessel sometimes to one side and sometimes to another, the fume preserves its surface horizontal after the nature of other fluids That heat may be produced by attrition That camphire will not take fire, and that gunpowder, though some of the grains of a heap of it be kindled by a burning glass, will not give fire to the contiguous grains That glow worms lose their light in proportion as the air is exhausted, and at length become totally obscure, but on readmitting the air, they presently recover it all That a bell on being struck, is not heard to ring, or very faintly That water freezes But that a syphon will not run That electricity appears like the aurora borealis With multitudes of other curious and important particulars, to be met with in the numerous writings on this machine, namely, besides the Philos Transactions of most academies and societies, in the writings of Torricelli, Pascal, Mersenne, Guericke, Schottus, Boyle, Hook, Duhamel, Mariotte, Hawkshee, Hales, Muschenbroeck, Gravesande, Desaguliers, Franklin, Cotes, Helsham, Martin, Ferguson, Adams, Nicholson, Cavallo, Gregory, Hutton, &c

AIR-SHAFTS, among miners, denote holes or shafts let down from the open air to meet the adits, and furnish fresh air The damps, want and impurity of air which occur, when adits are wrought 30 or 40 fathoms long, make it necessary to let down air-shafts, in order to give the air liberty to play through the whole work, and thus discharge bad vapours, and furnish good air for respiration the expence of which shafts, in regard of their vast depths, hardness of the rock, drawing of water, &c sometimes equals, nay exceeds, the ordinary charge of the whole adit.

AIR-VESSEL, in hydraulics, is a name given to those metalline cylinders, which are placed between the two forcing-pumps in the improved fire-engines The water is injected by the action of the pistons through two pipes, with valves, into this vessel, the air previously contained in it will be compressed by the water, in proportion to the quantity admitted, and by its spring force the water into a pipe, which will discharge a constant and equal stream, whereas in the common squirting engine, the stream is discontinued between the several strokes

AIR-VESSELS, in botany, are certain canals, or ducts, by which a kind of absorption and respiration is effected in vegetables Air vessels are distinguished from sap-vessels, the former being supposed to correspond to the trachea and lungs of animals, the latter to their lacteals and blood-vessels Air-vessels are found not only in the trunks or stems, but also in the leaves of all plants, and are easily discoverable in many without the help of glasses, for upon breaking the stalk or chief fibres of a leaf the likeness of a fine woolly substance, or rather of curious small cobwebs, may be seen to hang at both the broken ends, and this is really a skein of air-vessels See Grew's Anat of Roots, ch iv p 155, &c See also Darwin's Phytologia, where the air-vessels and the absorbents of plants are very ingeniously distinguished

AIRY a (from *air*, *aereus*, Lat) 1 Composed of air (*Bacon*) 2 Relating to the air (*Boyle*) 3 High in air (*Addison*) 4 Open to the free air (*Spenser*) 5 Light as air unsubstantial (*Shakspeare*) 6 Without reality, vain, trifling (*Temple*) 7 Fluttering loose, full of levity (*Dryden*) 8 Gay, sprightly, full of mirth, vivacious, lively, light of heart (*Taylor*)

AIRY TRIPLICITY, in astrology, the signs Gemini Libra, and Aquarius

AISE, a river of France which runs into the Orne, three leagues above Caen

AISLE s The walk in a church (*Addis*)

AISNE, in geography, a river of France, which rises in Champagne, runs by Soissons, and falls into the Oise above Compiegne It gives name to a department which is one of six formed of the ci devant Soissonnois, le Beauvoisis and le Vexin Francois, and is one of the five into which the ancient Isle of France is divided

AISTHESIS (αἴσθησις, from αἰσθάνομαι, *to perceive*) A sense, either external, as the sight, touch, &c or internal, as the memory, judgment &c

AISTHETERIUM αἰσθητήριον, from αἰσθα-

νοεω, to perceive) The sensory, or seat and origin of sensation See SENSORIUM COMMUNE

AIT *s* A small island in a river

AITONA, in geography, a small town of Spain in Catalonia, the capital of a marquisate

AITONIA In botany, a genus of the class and order monadelphia octandria, so named in honour of Mr Aiton, the royal and truly-scientific gardener at Kew It is thus characterised, calyx four-parted, petals four, style one, berry dry, quadrangular, one-celled, many-seeded The only known species is a cape-shrub with flesh-colour flowers

AJUGA Bugle ground pine A genus of the class and order didynamia gymnospermia Its corol with the upper lip very minute and emarginate stamens longer than the upper lip It includes ten species found in different parts of Europe and Asia of which two are common to our own woods and fields The a reptans (creeping bugle) found in the former, and the a chamæpitys (common ground pine) frequent in the latter. The a pyramidalis, a native of Denmark, and other parts of Europe, is still employed in medicine, and constitutes the consolida media of the pharmacopœias, which see

AIUS LOCUTIUS, a deity to whom the Romans erected an altar, because under that name a supernatural voice had given warning of the attack about to be made on Rome by the Gauls in the time of Camillus

AJUTAGE or ADJUTAGE, in hydraulics, part of the apparatus of a jet d'eau, or artificial fountain, being a kind of tube fitted to the aperture or mouth of the cistern, or the pipe, through which the water is to be played in any direction, and in any shape or figure

It is chiefly the diversity in the ajutage, that makes the different kinds of fountains So that, by having several ajutages, to be applied occasionally one fountain is made to have the effect of many

Mariotte, Gravesande and Desaguliers have written pretty fully on the nature of ajutages, or spouts for jets d'eau, and especially the former He affirms, from experiment that an even polished round hole, made in the thin end of a pipe, gives a higher jet than either a cylindrical or a conical ajutage, but that, of these two latter however, the conical is better than the cylindrical figure

The quantity of water discharged by ajutages of equal area, but of different figures, is the same And for like figures, but of different sizes, the quantity discharged is directly proportional to the area of the ajutage, or to the square of its diameter, or of any side or other linear dimension so, an ajutage of a double diameter, or side, will discharge 4 times the quantity of water, of a triple diameter, 9 times the quantity, and so on, supposing them at an equal depth below the surface or head of water But if the ajutage be at different depths below the head, then the celerity with which the water issues, and consequently the quantity of it run out in any given time, is directly proportional to the square-root of the altitude of the head, or depth of the hole so at 4 times the depth the celerity and quantity is double, at 9 times the depth, triple; and so on

It has been found that jets do not rise quite so high as the head of water, owing chiefly to the resistance of the air against it, and the pressure of the upper parts of the jet upon the lower and for this reason it is, that if the direction of the ajutage be turned a very little from the perpendicular, it is found to spout rather higher than when the jet is exactly upright

It is found by experiment too, that the jet is higher or lower, according to the size of the ajutage that a circular hole of about an inch and a quarter in diameter jets highest, and that the farther from that size, the worse Experience also shews that the pipe leading to the ajutage should be much larger than it, and if the pipe be a long one, that it should be wider the farther it is from the ajutage Hutton's Dictionary

For the experiments of Bossut on this interesting subject, see Gregory's Mechanics, book iv ch 2

AIX, a small island on the coast of France Lat 46 5 N Lon 1 5 W

AIX, an ancient city of Provence, in France Lat 43 32 N Lon 5 32 E

AIX LA CHAPELLE, a fine city of Westphalia, in Germany It is famous for several councils and treaties of peace concluded here, particularly those between France and England in 1748 It is 26 miles almost E from Liege, and 40 almost W from Cologne Lat 50 50 N Lon 5 48 E

AIX LA CHAPELLE A town in the south of France, renowned in medicine and chemistry for its sulphureous water, the most striking feature of which, and what is almost peculiar to it, is the unusual quantity of sulphur it contains, the whole, however, is so far united to a gaseous basis, as to be entirely volatilized by heat so that none is left in the residuum after evaporation This thermal water is much resorted to on the continent, for a variety of complaints It is found essentially serviceable in the numerous symptoms of disorders in the stomach and biliary organs, that follow a life of high indulgence in the luxuries of the table, in nephritic cases, stiffness and rigidity of the joints and ligaments, from rheumatism and gout, in palsy, and in the distressing debility which follows a long course of mercury and excessive salivation

AIZOON In botany, a genus of the class and order icosandria pentagynia Calyx five-parted, petalless, capsule superior, five-celled, five-valved There are ten species, the greater number of which are indigenous to the Cape Spain owns one and the Canaries one; the a Canariense and the a Hispanicum

AIZOUM (*αειζωον*, from *αει*, *always*, and *ζαω*, *to live*) An ever-green aquatic plant, like the aloe

To AKE *v n* (from *αχος*, Gr) To feel a lasting pain (*Locke*)

AKENSIDE (Mark), an English poet and physician, was born at Newcastle upon-Tyne, Nov 9, 1721 His father was a butcher, and intending him for the office of a dissenting minister, gave him an education accordingly At the age of eighteen he was sent to Edinburgh, but instead of divinity he entered on the study of physic In 1741, he went to Leyden, where, in 1744, he took his degree of M D The same year appeared his most celebrated performance, "The Pleasures of Imagination, a poem which being shewn to Mr Pope, he said, "This was no every-day writer He began to practise as a physician at Northampton, but finding no chance of succeeding there, removed to Hampstead, and his friend Mr Dyson generously allowed him 300l a year till he could fix himself in practice Having been admitted to his doctor s degree at Cambridge, he was elected a fellow of the college of physicians, and one of the physicians of St Thomas s Hospital, and on the establishment of the queen s household, he was appointed one of her majesty s physicians In 1764, he printed a discourse in Latin on the dysentery, and was in a fair way of attaining considerable eminence in his profession, when he was taken off by a putrid fever, June 23, 1770 His remains were interred in the church of St James, Westminster The poem on ' The Pleasures of Imagination was published in an elegant form, with a classical preface, by Mrs Barbauld, in 1795 —*Watkins*

AKIBA, a Jewish rabbi, was at first a shepherd, but at the age of forty devoted himself to learning, and became a celebrated preceptor, first at Lydda, and afterwards at Jasna, in the first century He joined the pretended Messiah Barchochebas, for which, with his son Bappus, he was flayed alive by the Romans, A D 135 He was one of the first compilers of the traditionary institutions according to the cabalistic mysteries

AKIN *a* (from *a* and *kin*) 1 Related to allied by blood (*Sidney*) 2 Allied to by nature (*L Estrange*)

AKISSAT, the ancient Thyatira, a city of Natolia, in Asia, 50 miles from Pergamos Lat. 38 50 N Lon 28 30 E

AKOND an officer of justice in Persia, who takes cognizance of the causes of orphans and widows, of contracts, and other civil concerns

AKOUSCHY, in zoology See CAVIA ACUSCHY

AL, as an Arabic noun, denotes God, heaven, divine, as an Arabic particle, it is prefixed to words to give them a more emphatic signification, signifying much the same with our particle *the* as in *Alkoran*, the Koran, *alkermes*, *the* kermes, and in the Arabic astronomy, we have *Al thuraiya*, the Pleiades, *Al phera*, *Al nechra*, *Al terpha* &c

AL, or ALD, a Saxon term prefixed to the names of places denoting their antiquity, as Aldborough, Aldgate, &c

ALA (עלה, *alla*, a leaf, Heb) 1 A wing PINNA, which see 2. The arm pits 3 Any part capable of extension like a wing whence in anatomy we meet with the alæ, or wings of the sphenoid bone and in botany find the term applied to the wing like membrane fixed to some seeds by which they fly away and are dispersed, as also to the leafy membrane which runs through the entire length of the stem, to the branch which grows from the stalk like a wing and the hollow or arm-pit which the leaf makes upon a stalk, and whence a new shoot arises

ALABA or ALAVA a subdivision of Biscay in Spain Here are plentiful mines of iron and steel

ALABARCHA, a magistrate whom the emperors permitted the Jews of Alexandria to elect to decide their disputes, &c

ALABASTER See GYPSUM and INOLITHUS

ALABASTER (William), an English divine, born at Hadley, in the county of Suffolk He was one of the doctors in Trinity-college, in Cambridge, but turned to the Roman communion, however, being soon dissatisfied with his new religion, he again became a Protestant and obtained a prebend in the cathedral of St Paul, and after that the rectory of Therfield, in Hertfordshire He was well skilled in the Hebrew tongue, and was strangely infatuated with the Caballa He gave a proof of his fondness for mystical interpretations in the sermon he preached at his taking the degree of doctor of divinity when he took for his text the words "Adam, Seth, Enos, and endeavoured to prove that each of these words contained a hidden mystery He wrote a Latin tragedy, entitled Roxana, which, when it was acted in a college at Cambridge, was attended with a remarkable circumstance, for a lady was so terrified at the last words, *Sequar sequar*, which were pronounced in a very shocking tone, that it is said she lost her senses, and never again recovered them He wrote a Hebrew Lexicon in folio, and several other works He was living in 1630

ALABASTRA (αλαβαστρα from αλαβαστρον, *a box of perfume*) The bud of a flower or the calyx that supports it, so called from its shape and odour, the former resembling the ancient box which contained precious balsams

ALACK! *interj* Alas! an expression of sorrow (*Shakspeare*)

ALACKADAY! *interj* A word noting sorrow and melancholy

ALACRIOUSLY *ad* Cheerfully, without dejection (*Gov of the Tongue*)

ALACRITY *s* (*alacritas*, Lat) Cheerfulness, sprightliness, gayety (*Dryden*)

ALÆ (the plural of *ala*) The nymphæ

ALÆ NASI The lateral or moveable parts of the nose Pinnæ nasi

ALÆ VESPERTILIONUM (*vespertilio, quod vespere volat*) That part of the ligament of the womb which lies between the tubes and the ovaria so called from its resemblance to the wings of the vespertilio, or bat

ALÆ. In botany, the two side petals of a papilionaceous flower. (See WINGS.) The angle formed by a branch with the stem, or by a leaf with the branch, was formerly expressed by this term; but it is now called the axilla or axil; which see.

ALAIA PHTHISIS (from αλαιω, *blind*, and φθισις, *a wasting*). Lumiciation from a catarrh or coryza.

ALAGTAGA. See DIPUS, or JARBOA.

ALALCOMENIUS, the Bœotian name for the Athenian month Mæmacterion.

ALAMANDA. In botany, a genus of the class and order pentandria monogynia. Its corol is twisted, capsule lens formed, erect, echinate, one-celled, two-valved, many seeded. The only known species is a native of Guiana, a climbing milky plant with yellow, terminal flowers, the leaves of which in an infusion are esteemed useful in the colic and other diseases of the alimentary canal.

ALAMANNICUM, a tribute imposed by the emperor Alexius Angelus, on obtaining a peace with the Alemanni.

ALAMBIC. See ALEMBIC.

A-LA-MI-RE, in the gamut, is the octave above A-RE, or A in the first space in the base cliff.

ALAMODE, a phrase originally French, importing a thing to be in the fashion or mode.

ALAMODE, in commerce, a thin glossy black silk, chiefly used for women's cloaks and men's mourning scarfs.

ALANABOLUS (αλαναβωλος, from αλανο, *oily*, and βωλο, *earth*). English otter.

ALANATERRA. The same as alanabolus.

ALAND, or ALANDT, an island belonging to Sweden, in the Baltic, about forty leagues in circumference, encompassed with small islands and rocks; it was anciently independent, but now makes part of Finland. Castelholm is the principal place. Lat. 60. 18 N. Lon. 37. 40 E. Ferro.

ALAND, a river of Germany, which runs into the Elbe, near Snackenburg, in the principality of Lunenburg.

ALAND, *ad.* (from *a* for *at*, and *land*.) At land; landed; on the dry ground (*Dryd.*)

ALANDAHAL (*hitter*, Arab.) The bitter-apple, or colocynth.

ALANDSBAY, on the south coast of Ireland, between Waterford harbour and Tramore bay, eight miles S. of Waterford.

ALANGIUM. In botany, a genus of the class and order polyandria monogynia. Calyx six or ten-toothed, superior; petals six or ten; berry barky, two or three seeded. There are two species, both of which are natives of India.

ALANORARIUS, anciently, a manager of dogs for hawking.

ALANS, or ALANI, a people who, like the Huns, were of Asiatic origin, but represented by Ammianus Marcellinus, as "victu mitiores et cultu," more polished in their customs and manners. Pliny (H. N. lib. iv. c. 12.) erroneously places them in Europe, beyond the mouth of the Danube: but Josephus (De Bell. Jud. lib. vii. c. 29.) traces their origin more accurately, and describes them as Scythians who dwelt between the river Tanais and the lake Mæotis.

ALANTOID. See ALLANTOID.

ALARAF, in the Mahometan theology, the partition wall that separates heaven from hell. The word is plural, and properly written al araf, in the singular it is written al arf. It is derived from the Arabic verb *arafa*, to distinguish.

ALARBES, a name given to those Arabians who live in tents, and distinguish themselves by their dress from others who live in towns.

ALARE EXTERNUM (from *alaris*, winged, and *externum*, outward.) A name of the external pterygoid muscle, so called because it rises from the pennated process of the sphenoid bone.

ALARES, in antiquity, are supposed by some authors to have been a kind of militia, or soldiery, among the Romans, so called from *ala*, a wing, because of their lightness and swiftness in the combat. Others make them a people of Pannonia, but others, with more probability, take alares for an adjective, or epithet, and apply it to the Roman cavalry, because placed in the two wings, or alæ, of the army; for which reason, a body of horse was called ala.

ALARIA OSSA (*alaris*, winged.) The pennated or wing-like processes of the sphenoid bone.

ALARICUS, a famous king of the Goths who plundered Rome in the reign of Honorius. He was greatly respected for his military valour, and during his reign he kept the Roman empire in continual alarms. He died after a reign of 13 years. A. D. 410.

ALARM. *s.* (from the Fr. *a l'arme*, to arms.) 1. A cry by which men are summoned to their arms (*Pope*). 2. Notice of any danger approaching. 3. Any tumult or disturbance (*Pope*).

To ALARM. *v. a.* 1. To call to arms (*Addison*). 2. To surprise with the apprehension of any danger (*Tickel*). 3. To disturb in general (*Dryden*).

ALARM, or rather ALARUM, is also used for an instrument to awaken persons at a certain hour: one very simple contrivance of this kind is used by weavers. See WEAVER'S ALARM.

Plate 2. is a representation of a modern alarm clock of the most approved construction. A is the main arbor on which is fitted a wheel B with a groove on the edge to receive a line D *d*, to whose end *d* a weight is attached; the wheel B is at liberty to turn round without the arbor in one direction but is prevented from returning by a click fixed to the wheel which acts against the 4 arms of the great wheel F, this being firmly attached to the arbor. The clock is wound up, by pulling down that end of the line which has no weight; this turns the pulley D without the arbor, the click slip

ping over the arms of the wheel E, when the weight is permitted to descend, the click takes hold of the wheel, and by turning it, keeps the clock in motion. The wheel F turns a pinion on the arbor *f*, which also carries a wheel F, this wheel turns the contrate wheel G by a pinion on its arbor, the contrate wheel turns a pinion on the arbor of the balance wheels H, in which the pallets of the verge *k* play. As the pendulum vibrates, the teeth of the balance-wheel escape from the pallets, one at a time, and allow the weight to turn the wheel of the machine, the number of teeth in which must be such, that the great wheel E shall revolve once in two hours. The pinion *d* on the end of the arbor A has 8 leaves, and turn the wheels *b*, of 48 teeth, once round in 12 hours; its arbor carries the hand I, by which the time is noted on the dial-plate (supposed to be removed). K is a pulley similar to B, which turns round on a pin fixed in the back plate of the machine, its click turns a crown wheel L, which works a verge similar to that of the escapement before described, the upper end of this verge is bent, and carries a hammer which strikes the inside of the bell M. The wheel L has a pin projecting from its circumference, which falls against the end of a lever *m*, and prevents the weight N from turning the wheel until the lever is raised, by means of another lever *n* fixed on the same axis. The arbor of the hour wheel *b* is not fastened to the wheel itself, but to the circular plate O, fig. 2, against which the wheel is pressed by a pin put through the arbor behind the wheel, so as to cause a considerable friction, which makes the arbor and hand attached to it to turn with the wheel; but the hand may at any time be moved independently of the wheels in correcting the clock's time. P is a collar that fits on the arbour, and has two springs of thin brass at its end, which press against the plate O, and make the collar move somewhat stiff on the arbor; Q is a circle put on the end of the collar, so as to turn with it: this circle, and his the 12 hours engraven on it, and they are read by the short end of the hand I. These parts are put together, by first placing the wheel *l* behind the plate O and pinning it on, the collar P is put on, and next the arbor is put in its place in the machine, and the dial-plate fixed on, the circle Q is fixed in its place, the hands next, and lastly all is secured by a pin, put through the arbor beyond the hand. One of the springs of the collar P has a pin projecting from it, which, as the collar turns round, takes the end of the lever *n*, and raises it up, the lever *m* is raised at the same time, so as to set the alarum in motion. When the machine is to be used, both weights must be drawn up, and the circle Q turned round, so as to bring the short end of the hand I to the figure on the plate, corresponding to the hour when the alarm is wished to go off. As the hand I turns round by the action of the great weight it carries the collar and circle Q with it, till the hand comes to the same hour on the dial, when the pin in the spring lifts up the lever *n*, and also the lever *m*, so as to allow the pin in the wheel L to pass by, as the wheel turns round by the action of the weight, it throws the hammer backwards and forwards against the inside of the bell, as shewn in fig. 3.

ALARMBELL. *s.* (from *alarm* and *bell*.) The bell that is rung at the approach of an enemy. This is what the French call tocsin.

ALA'RMING. *particip. a.* (from *alarm*.) Terrifying, awakening, surprising.

ALA'RMPOST. *s.* (from *alarm* and *post*.) The post appointed by each body of men to appear at, when an alarm shall happen.

ALAS! *interject.* (*helas*, Fr.) 1. A word expressing lamentation (*Pope*). 2. A word of pity (*Shakspeare*). 3. A word of sorrow and concern (*Milton*).

ALASCANI, in church history, a sect of Antilutherans, whose distinguishing tenet besides their denying baptism, is said to have been this, that the words, "This is my body," in the institution of the eucharist, are not to be understood of the bread, but of the whole action or celebration of the supper.

ALA'TE. *ad.* (from *a* and *late*.) Lately.

ALATE. See WINGED.

ALATED ANIMALS, such as are furnished with wings.

ALATED LEAVES, in botany, such as are composed of several pinnated ones. See PINNATED.

ALATERNOIDES, in botany, a species of the myrica. See MYRICA.

ALATERNUS, hithand. See PHYLICA.

ALATHER (*alather* from the article *the*, and *adhesion*, Arab.) An adhesive mineral described by Avicenna.

ALAUDA. Lark. In the Linnean system the seventy-fifth genus in order six, or passeres, of the class aves. The following is its generic character: Bill cylindrical, subulate, straight; the mandibles equal, and a little gaping at the base; tongue bifid; hind claw straight, longer than the toe. (See Nat. Hist. Plate I.) Ornithologists have described upwards of thirty species of this exquisitely musical bird, of which the following are the chief:

1. A. arvensis. Sky lark, field lark, which inhabits Europe, Asia, and Africa; seven inches long; feeds on fruits and insects; sings sweetly at the earliest dawn, and soars spirally in the air, increasing the volume of its note as it ascends; assembles in vast flocks in winter, when it becomes very fat; builds on the ground beneath a clod, and lays four or five greenish-white eggs with dusky confluent spots. This and the wood-lark are the only birds that sing as they fly. Body, above, varied with blackish, reddish-grey, and whitish; beneath, reddish-white; bill and legs black; throat spotted with black. There are four or five varieties.

2. A. pratensis. Titlark. Inhabits Europe, in low grounds; five and a half inches long; has a fine note, and sings sitting in trees or on the ground. Bill black; body, beneath white; breast ochre-yellow, with oblong black spots; legs yellowish.

3 A. arborea. Wood-lark. Inhabits Europe and Siberia: less than the sky-lark, sits on trees, and whistles like the black-bird: sings in the night, and while flying: builds on the ground; eggs dusky, with deep brown blotches. Head surrounded with a white annular fillet: body varied, like A. arvensis; legs flesh-colour.

4. A. obscura. Rock-lark. Inhabits rocky places in England: seven and a quarter inches long: is solitary, and sings but little. Its note like the chirp of the grasshopper. Bill slender, long, brown, deeper at the tip; tail three inches long, not wedged; legs red-brown; hind-claw hooked, hardly longer than the toe.

5. A. cristata. Crested lark. Inhabits Europe; six and three-quarters inches long: like the bull-finch, learns with ease to repeat tunes played or sung to it, in doing which it articulates every note distinctly, and entirely drops its native warble. Bill brown, crest darker than the body; body cinereous, breast and belly white, with a yellow band: tail feathers black, head crested; legs black.

ALAY, signifying, in the Turkish language, "The Triumph", is a ceremony which accompanies the assembling together the forces of that vast empire upon the breaking out of a war.

ALB, or ALBE, in the Romish church, a vestment of white linen hanging down to the feet, and answering to the surplice of the English clergy. In the ancient church, it was usual with those newly baptised to wear an alb, or white vestment, and hence the Sunday after Easter was called dominica in albis, on account of the albs worn by those baptised on Easter day.

ALB is also the name of a Turkish coin, otherwise called Asper.

ALB, a river of Germany which rises three miles WNW. Wildbad in the circle of Swabia, and runs into the Rhine, above five miles WNW. Durlach.

ALBA, surnamed Pompeia, and celebrated by Ptolomy and other ancient authors, is one of the principal cities of Old Liguria; but having been in the hands of many masters, it has lost its ancient splendour. It is situated in the duchy of Montferrat, and is 22 miles S. E. of Turin. Lat. 44. 50 N. Lon. 8. 5 E.

ALBA FIRMA, in old customs, rent paid in silver.

ALBA TERRA, one of the many names that were given by alchemists to the philosopher's stone.

ALBADARA, (*albadan*, Arab.) The bone of the first joint of the great toe.

ALBAGEASI, (Arab.) the process of the os sacrum.

ALBAMENTUM, (from *albus*, white.) The albumen or white of the egg.

ALBAN (St.), is said to have been the first person who suffered martyrdom for christianity in Britain; he is therefore usually styled the protomartyr of this island. He was born at Verulam, and flourished towards the end of the third century. In his youth he took a journey to Rome, in company with Amphibalus a monk of Caerleon, and served seven years as a soldier under the emperor Dioclesian. At his return home, he settled in Verulam, and, through the example and instructions of Amphibalus, renounced the errors of paganism, in which he had been educated, and became a convert to the Christian religion. It is generally agreed, that Alban suffered martyrdom during the great persecution under the reign of Dioclesian; but authors differ as to the year when it happened. Bede and others fix it in 286; some refer it to the year 296; but Usserius reckons it amongst the events of 303. Between 4 or 500 years after St. Alban's death, Offa king of the Mercians built a very large and stately monastery to his memory; and the town of St. Alban's in Hertfordshire takes its name from our protomartyr.

ALBANI (Francis), an Italian painter, was born at Bologna in 1578. His first master was Denys Calvert, who left him to the instruction of his pupil Guido Rheni, whom he accompanied to the school of the Caracci. Having finished his studies at Bologna, Albani went to Rome, where he married, but on the death of his wife he returned to his native place, and again entered into the matrimonial state with a woman of the name of Doralice, who was very beautiful. She brought him several fine boys, and Albani painted pieces in which his wife and children served as models for Venus and Cupids. He was fond of representing the fair sex: and his compositions on love subjects are held in high esteem. He died in 1660.

ALBANI, in antiquity, a college of the priests of Mars.

ALBANIA, a province of Turkey in Europe, on the Gulph of Venice, bounded by Livadia on the S. by Thessaly and Macedonia on the E. and by Bosnia and Dalmatia on the N.

ALBANIA, a country of Asia, bounded on the W. by Iberia; on the E. by the Caspian Sea, on the N. by Mount Caucasus, and on the S. by Armenia and the river Cyrus, now Kur.

ALBANS (St.), a borough town of Hertfordshire, twenty one miles from London. It sends two members to parliament, and has a market on Wednesday and Saturday. This town rose from the ruins of the ancient city Verulam, many vestiges of which are to be seen in the neighbourhood. The church of the abbey is remaining to this day: time and the weather have made it look like stone on the outside, but if a bit be broken off, the redness of the brick immediately appears. When the monasteries were dissolved, the townsmen paid 400 pounds to prevent its being levelled with the ground; and have since converted it into a parish-church, which, for its largeness, beauty, and antiquity, claims a particular regard. It had a very noble font of solid brass, in which the children of the kings of Scotland were used to be baptized, and was brought from Edinburgh, by sir Philip Lea, when that city was in flames; but in the times of the late civil wars it was taken away. Here

Cæsar obtained a victory over Cassibelaun, and this was the scene of Boadicea's victory and cruelty, when she massacred 70,000 Romans and Britons who adhered to them. Near this place were fought two obstinate battles between the houses of York and Lancaster. Lat. 51. 44. N. Lon. 0. 13. W.

ALBANY, a British fortress on the S. W. of Hudson's Bay. Lat. 52. 20. N. Lon. 81. 20. W.

Albany, a town of North America, the capital of one of the ten counties of the province of New York. Lat. 42. 36. N. Lon. 74. 20. W.

ALBARA (אלברדא *alla'ra*, Chald.) The leuce or white leprosy.

ALBARAZIN, a strong and large town of Arragon in Spain. Lat. 40. 2. N. Lon. 1. 16. W.

ALBARII, in antiquity, those who made earthern vessels; whereas those who whitened walls were called Dealbatores.

ALBARIUM OPUS, in ancient buildings, the incrustation or covering of roofs with white plaster.

ALBATEGNI, an Arabic prince of Batan in Mesopotamia, was a celebrated astronomer about the year of Christ 880. He wrote in Arabic a work under the title of The Science of the Stars, comprising all parts of astronomy. Editions of this were printed at Nuremberg in 1537, and at Bologna in 1645. Albategnus is highly spoken of by Dr Halley, as a vir admirandi acuminis, ac in administrandis observationibus exercitatissimus.

ALBATHOUI, in farriery, horses having white furniture.

ALBATROSS, in ornithology. See DIOMEDEA.

ALBEIT, *ad.* Although, notwithstanding, though it should be.

ALBEMARLE, a small town in the late province of Normandy, France, but now reckoned in the department of Lower Seine. From this place the Keppel family of England take their title of earl. It also furnished the title of a duke to the famous general Monk. It is seated on the declivity of a hill. Lat. 49. 50. N. Lon. 1. 36. E.

Albemarle, a county in Virginia between the Blue Ridge and the Tide waters.

ALBERAS, (*alberas*, Arab.) 1. White pustules on the face. 2. The herb staphisagria, or stavesacre, whose juice was formerly used as a remedy for them.

ALBERNUO, a kind of camlet from the Levant.

ALBERONI (Julius), the son of a poor gardener, in the suburbs of Placentia, born in 1664, who, by his great abilities and good fortune, rose from this low original, to the employment of first minister of state at the court of Spain, and to the dignity of cardinal. He roused that kingdom out of the lethargy it had sunk into for a century past, awakened the attention and raised the astonishment of all Europe, by his projects; one of which was to set the Pretender on the throne of Great Britain. He was at length deprived of his employment, and banished to Rome: he died in 1752, at the great age of 89. His Testament Politique, collected from his memoirs and letters, was published at Lausanne in 1753.

ALBERTI (Dominico), an Italian musician, was a native of Venice. He came to London as page to the Spanish ambassador, and afterwards went to Rome, where he attained great eminence as a singer and performer. He excelled on the harpsichord, and invented a new style of playing on that instrument. In 1737, he set to music Metastasio's "Endimione," and published some other fine pieces of his composition.

Alberti (Leone Battista), was descended from a noble family in Florence, and was perfectly acquainted with painting, sculpture, and architecture. He wrote on all three in Latin; but his studies did not permit him to leave any thing considerable behind him in painting. He was employed by pope Nicholas V. in his buildings, which he executed in a beautiful manner; and his work on architecture, which consists of ten books, is greatly esteemed. He also wrote some treatises of morality, and a piece on arithmetic. He was born in 1398, and died in 1472.

ALBERTUS (Magnus), a learned dominican, was born in Suabia, at the beginning of the thirteenth century. He became successively vicar-general and provincial of his order, and pope Alexander IV. made him master of the sacred palace. In 1260, he was preferred to the bishopric of Ratisbon, which he soon afterwards resigned, and retired to his cell to enjoy his studies. His knowledge of nature was so great that he was accounted a magician, and several ridiculous tales are told of him. He died at Cologne in 1280. His works, consisting of 21 vols. folio, were printed at Lyons in 1651. He wrote upon most of the mathematical sciences.

ALBI. See ALBY.

ALBICANTIA (from *albico*, to grow white). Willis's glands in the brain, so called from their white colour.

ALBIGENSES, a sect about Tholouse and Alby, in Languedoc, whence they derived their name; who, in the twelfth century, became remarkable for their opposition to the discipline and ceremonies of the church of Rome. This sect had their name, it is supposed, either by reason there were great numbers of them in the diocese of Albi, or because they were condemned by a council held in that city. In effect, it does not appear that they were known by this name before the holding of this council. Other names given to them are Henricians, Abelardists, Bulgarians, &c., some on account of the qualities they assumed, others on that of the country from whence it is pretended they were derived, and others on account of persons of note who adopted their cause, as Peter de Bruis, Arnold de Bresse, Abelard, Henry, &c. Berengarius, if not Wickliff himself, is by some ranked in the number. The Albigenses are frequently con-

founded with the Waldenses, from whom, however, they differ in many respects, both as being prior to them in point of time, as having their origin in a different country, and as being charged with divers heresies, particularly Manicheism, from which the Waldenses are exempt. But several protestant writers have vindicated them from this imputation. Dr Allix shews, that a great number of Manichees did spread over the western countries from Bulgaria, and settled in Italy, Languedoc, and other places, where there were also Albigenses, by which means being both under the imputation of heresy, they came either by ignorance or malice, to be confounded and called by the same common name, though in reality entirely different. See WALDENSES.

Other errors imputed to them by their opponents, the monks of those times, were, that they admitted two Christs, one evil, who appeared on earth, the other good, who is not yet appeared. That they denied the resurrection of the body, and maintained human souls to be demons imprisoned in our bodies, by way of punishment for their sins. That they condemned all the sacraments of the church, rejected baptism as useless, held the eucharist in abhorrence, excluded the use of confessions and penance, maintained marriage unlawful, laughed at purgatory, prayers for the dead, images, crucifixes, &c.—There were likewise said to be two classes of them, the Perfect and the Believers. The perfect boasted of their living in continence, of eating neither flesh, eggs, nor cheese. The believers lived like other men, and were even loose in their morals; but they were persuaded they should be saved by the faith of the perfect, and that none were damned who received imposition of hands from them. But from these charges also they are generally acquitted by Protestants, who consider them as the pious inventions of the Romish church, whose members deemed it meritorious by any means to blacken heretics.

The curious reader who desires to know more concerning the history of the Albigenses, may consult Perrin's Hist. ... Limborch's History of the Inquisition, by Chandler, vol. i. p. 42—70. Mosheim's Eccl. Hist. vol. ii. p. 580. 8vo.

ALBINOS, a diseased variety of the human race, highly curious and extraordinary, proceeding from some unknown constitutional affection, first noticed by the Portuguese, as existing among African negroes, and in which the surface of the body is rendered white, whence the distinctive name. The same morbid affection is now known to exist occasionally among other tribes. See the article HOMO.

ALBINUM, (*albus*, white.) cotton weed; so called from the whiteness of its blossom.

ALBINUS, was born at Adrumetum in Africa, and made governor of Britain, by Commodus. After the murder of Pertinax, he was elected emperor by the soldiers in Britain. Severus had also been invested with the imperial dignity by his own army, and these two rivals, with about 50,000 men each, came into Gaul to decide the fate of the empire. Severus was conqueror, and he ordered the head of Albinus to be cut off, and his body to be thrown into the Rhone. A. D. 198.—There were others of this name of less note among the Romans.

ALBION, son of Neptune by Amphitrite, came into Britain, where he established a kingdom, and first introduced astrology and the art of building ships. He was killed at the mouth of the Rhone, with stones thrown by Jupiter, because he opposed the passage of Hercules. The great island of Europe, now called Great Britain, is called after Albion, who is said to have reigned there; or from its chalky white (albus) rocks, which appear at a great distance.

ALBION NEW, a name given by Sir Francis Drake, to California.

ALBIREO, in astronomy, a star in the constellation Cygnus, marked β by Bayer.

ALBIS, in ancient geography, the Elbe.

ALBOGALERUS, in antiquity, a white cap worn by the flamen dialis.

ALBORAK, in the Mahometan theology, the beast on which the prophet is said to have ridden in his extraordinary aerial journeys. It is represented as of an intermediate shape and size between an ass and a mule, and many fabulous accounts are given of it by the Arabian commentators.

ALBUCA. In botany, a genus of the class and order hexandria monogynia, thus characterized. Corol six petalled, the inner-ones connivent, outer-ones spreading; style triangular. There are fourteen species, all natives of the Cape, of which some have only three and others all the stamens fertile.

ALBUCUM, (*albus*, white.) The herb white asphodel.

ALBUGINEA OCULI. (*albuginea* seu *tunica*, from *albus* white.) See ADANATA.

ALBUGINEA TESTIS, (from *albus* white.) The innermost coat of the testicles, so called on account of its white colour. It is a strong dense membrane immediately covering the body or substance of the testicle. On its outer surface it is smooth, but rough and uneven on its inner.

ALBUGINEOUS, *a.* (*albugo*, Lat.) Resembling the white of an egg. (*Brown.*)

ALBUGO OCULI. (from *albus* white.) a white speck or opacity of the cornea.

ALBUM, in antiquity, a kind of white table or register, wherein the names of magistrates, public transactions, &c. were entered. Of these there were various kinds.

ALBUM, in later times, a kind of table or pocket book presented as a mark of respect to men of letters. When Algernon Sydney was in Denmark, the University of Copenhagen presented him with their album, on which he wrote these words:

———Manus hæc inimica tyrannis
Ense petit placidam sub libertate quietam.

ALBUM is sometimes used for white lead,

Album, among alchemists, a tincture by which they pretended to transmute metals.

ALBUMAZAR, an Arabian astrologer and physician, of the ninth century. His works were printed in Latin, at Venice, in 1580, octavo. The chief of these is the Introductio in Astronomiam, first printed in 1489.

ALBUMEN, **Albumina**, (from *albus*, white.) 1. The white of the egg. 2. One of the radical parts of animal matter, and so called as possessing the properties of the white of the egg. The coagulable lymph, or coagulum of the blood, as also the serum consists largely of it. Its most distinguishing character is, that when exposed to little less than half the heat of boiling water, its liquidity and transparency disappear, and it becomes opake, white, concrete, and solid. It undergoes the putrid but not the acetous fermentation. This substance is abundant in all animals, and chiefly contributes in the formation of web, membrane, cartilage, sponge, the horny shells of gorgoniæ or corals, horn, hair, feather, quill, hoof, nail, horny scale, crustaceous and tortoise shells. Its constituent parts are carbon, hydrogen, azot, with different proportions of oxygen, phosphoric and muriatic acid, soda, and lime. It is conjectured by many chemists to be the basis of all animal substances, and that gelatin and fibrin only or chiefly differ from it by possessing a larger proportion of oxygen. It is occasionally traced in the juices of vegetables, and especially of the tetradynamia or cruciform class.

Pure albumen is a fluid of a consistence somewhat viscous, perfectly soluble in pure water at the common temperature: but when exposed to a heat above 154° of Fahrenheit's thermometer, it coagulates, and is then no longer soluble in water.

Albumen has a slight subsaline taste, and, by converting the blue colours of vegetables into green, indicates the presence of an alkali. It is coagulable, not only by heat, as stated above, but also by the action of acids, more particularly the three mineral ones, and by all the metallic salts. Caustic alkalies, however hold it in permanent solution whether it be previously liquid or coagulated.

It is coagulable also by nitrat of silver, the red oxyd of mercury, tannin, and alcohol. If it be diluted with a considerable quantity of water, it is remarkable that no coagulation is produced by any of these agents.

Much diversity of opinion has prevailed among chemists with respect to the cause of the coagulation of albumen, but as it would exceed the limits of our work to enter into the discussion, we can only state in general terms, that Scheele ascribes the coagulation to the absorption of caloric, and Fourcroy to that of oxygen, while others suppose that no absorption takes place, but that the effect is produced by a change in the figures of the integrant particles of the albumen. A curious discussion of this point is given in the Supplement to the Encyclopædia Britannica, vol. II. p. 506.

Coagulated albumen is dissolved by the mineral acids, greatly diluted with water, and if a concentrated acid be added to the solution, the albumen is again precipitated. Alkalies, however, do not precipitate it from its solution in acids. But if a solution of tan be poured into the acid solution of albumen, a very copious precipitate appears.

If the solution of tan be poured into an aqueous solution of liquid albumen, it forms with it a very copious precipitate, which is insoluble in water. This precipitate is a combination of tan and albumen. This property furnishes us with a method of detecting the presence of albumen in any liquid in which we suspect it.

Pure alkalies and lime water also dissolve albumen, at the same time ammonia is disengaged, owing to the decomposition of part of the albumen. Acids precipitate the albumen from alkalies, but its properties are changed.

Nitric acid, when assisted by heat, disengages azotic gas from albumen, but the quantity is not so great as may be obtained from fibrin. The albumen is gradually dissolved, nitrous gas is emitted, oxalic and malic acids are formed, and a thick oily matter makes its appearance on the surface. When distilled, it furnishes the same products as fibrin, only the quantity of ammonia is not so great.

The discovery of albumen in vegetables is due to Fourcroy, who first obtained it from the juice of young cicutes. Having filtered two pounds of this juice while cold through blotting paper, he exposed it in a broad shallow vessel to the air, at a temperature of about 80° Fahr. In two hours, it deposited a greenish matter, and was then exposed to the heat of boiling water, which in a few minutes separated a large quantity of whitish flocculent matter. Another portion of the same liquor, instead of boiling, being exposed to the air, deposited at the end of two days a similar coagulum. On a third portion the same effect was produced by sulphuric acid. The substance thus obtained, after repeated washings in cold water, exhibited all the properties of animal albumen. It was afterwards found in the leaves and roots of various other plants.

By spontaneous decomposition in the open air, albumen passes rapidly into the putrid fermentation, smells fetid, becomes brown, and gives out ammonia.

Animal albumen, as contained in milk, and eggs, forms a considerable part of the food of man, that also which is found in vegetables contributes largely to his support. It is much used in the arts of dressing leather and refining sugar, and the more transparent kinds are employed for varnishes. The property it possesses of coagulating by heat, renders it effectual in clarifying liquors of various kinds.

It exists most abundantly in the antiscorbutic and narcotic plants, where it generally resides in the leaves, and its existence may be easily discovered by mixing the freshly expressed juice of these plants with spirits of wine, or by

macerating them with hot water, nearly to the boiling point—in both cases the albumen will be coagulated, and separated from the other fluids in the form of a cheesy matter

ALBUMEN OVI The albumen or white of the egg

ALBUMEN In botany a term used by Grew and Gærtner, for the substance of the lobes of the seed, which corresponds with the white in an egg

ALBURNUM The soft white substance in trees, between the liber or inner bark and the wood, gradually acquiring solidity, and becoming genuine wood —Intermedia substantia libri & ligni Lin Also the fluid that ascends through the vessels in spring time Both are equally denominated the sap

ALBY, a large and ancient town of France It is now the episcopal see of the department of Tarn, and contains 10,000 inhabitants The inhabitants make a figure in ecclesiastical history, under the title of Albigenses, they were the first that disputed the title of the pope and were condemned by a council here in 1170 The environs of Alby are very delightful Lat 43 50 N Lon 2 14 E

ALCA, in ornithology Genus thirty three, order three, or anseres of the classes of birds The Auk The following is its generic character Bill toothless, short compressed convex often transversely furrowed, lower mandible gibbous near the base nostrils linear legs mostly three-toed It is chiefly an inhabitant of the arctic seas, is very stupid, and builds in rabbit burrows, and fissures of rocks lays one egg Its colour is nearly uniform above black, beneath white body shaped like a duck's, the bill with oblique curved lines tending to a point which is sharp Of this genus there are eleven species of which those most worthy of remark are 1 A arctica, the puffin of which there are two varieties It inhabits the northern seas of Europe, Asia and America, in vast flocks feeds on small fishes crabs and sea-weed, twelve inches long flesh rank, except when very young eggs excellent body black, cheeks, breast, and belly white bill red, with a black base, upper eyelid with a sharp fleshy point legs red 2 A impennis, penguin great auk Inhabits Europe, and America three feet long is timid, cannot fly, and feeds on fishes egg six inches long, white with purplish lines and spots bill black, with from eight to ten grooves, wings short as though mere rudiments of wings secondary quill feathers tipt with white legs black (See Nat Hist pl XI) 3 A cirrata, tufted auk Inhabits Kamschatka, and the adjacent islands, nineteen inches long, lives on the water for days together, but never ventures far from land, feeds on shell fishes, which it opens with its bill Bill and legs red, front, sides of the head and chin white Female less than the male, bill with two grooves, tuft shorter, egg white The other species are, A Labradora, Labrador auk A tordan, razor-bill A cristatella, crested auk A Tetracula, dusky auk A psittacula, Perroquet auk A alle, little auk A antiqua; ancient auk A pygmæa, pigmy auk

ALCÆA ROSIA, (αλκαια, from αλκη, *strength*) The systematic name for the MALVA ARBOREA, which see Thus called from its supposed restorative powers

ALCÆUS a famous ancient lyric poet, was born at Mitylene, in the island of Lesbos He flourished in the 44th Olympiad, at the same time with Sappho who was likewise of Mitylene In the time of Alcæus, Mitylene suffered under the oppression of Pittacus He headed a strong party for the deliverance of his country, but in this proved unsuccessful, and was taken prisoner by Pittacus, who gave him his liberty, although he had been treated by him in a most abusive manner Alcæus was much addicted to the detestable Greek vice, the love of boys The name of his favourite was Lycus, of whom Horace speaks, and who is probably the boy whom Cicero notes for having a mole upon his finger which in the poet's eye, was a beauty The poetical abilities of Alcæus are undisputed, and though his writings were chiefly in the lyric strain, yet his muse was capable of treating the sublimest subjects with a suitable dignity

ALCÆUS an Athenian tragic poet, and as some think, the first composer of tragedies He renounced his native country Mitylene, and passed for an Athenian He left ten pieces, one of which was Pasiphae that which he produced when he disputed with Aristophanes, in the fourth year of the 97th Olympiad There is another Alcæus mentioned by Plutarch, perhaps the same whom Porphyrius mentions as a composer of satirical iambics and epigrams, and who wrote a poem concerning the plagiarism of Euphorus the historian He lived in the 145th Olympiad We are told likewise of one Alcæus, a Messenian who lived in the reign of Vespasian and Titus We know not which of these it was who suffered for his lewdness a very singular kind of death which gave occasion to the following epitaph

Αλκα ταφο ουτ☉, &c

This is Alcæus' tomb, who died by a radish, The daughter of the earth, and punisher of adulterers

Hence we may understand the menace of Catullus,

Ah! tum te miserum, malique fati,
Quem attractis pedibus, patente porta,
Percurrent raphanique mugilesque EPIG XV

Ah! wretched thou and born to luckless fate,
Who art discover'd by the unshut gate!
If once alas! the jealous husband come,
The radish, or the sea fish is thy doom

ALCAHEST See ALKAHEST

ALCAIC ODE, a kind of manly ode composed of several strophes, each consisting of four verses the first two of which are always alcaics of the first kind, the third verse is a diameter hypercatalectic, or consisting of four feet and a long syllable and the fourth verse is an alcaic of the second kind

ALCAICS, in ancient poetry, a denomination given to several kinds of verse, from Alcæus, their inventor The first kind consists of five feet, viz a spondee, or iambic, an iambic, a long syllable, a dactyle another dactyle The second kind consists of two dactyles and two trochees as, Exili | um impo- si | turn | cymbæ Besides these two, which are called dactylic alcaics, there is another styled simply alcaic, consisting of an epitrite, a choriambus, another choriambus, and a bacchius

ALCAID ALCAYDE, or ALCALDE, in the polity of the Moors, Spaniards, and Portuguese, a magistrate, or officer of justice, answering nearly to the French provost and the British justice of peace

ALCALI See ALKALI

ALCANNA, in commerce a powder prepared from the leaves of the Egyptian privet, and much used by the Turkish women to give a golden tinge to their nails and hair In dyeing, it gives a yellow colour when steeped with common water, and a red one when infused in vinegar There is also an oil extracted from the berries of alcanna, and used in medicine as a sedative

ALCANTARA a fortified town of Spanish Estremadura near the frontiers of Portugal It was besieged and taken by the earl of Galway, and the confederate Portuguese, in 1706 It is 142 miles N by W of Seville Lat 39 20 N Lon 6 7 W

ALCANTARA, a small town of Seville, in Andalusia Lat 37 40 N Lon 10 W

ALCANTARA, knights of, a military order of Spain the precise time of its institution is not known The history of this order is confined chiefly to the expeditions against the Moors

ALCAUDETE, a beautiful town of Spain in the province of Andalusia and country of Cordova, in the road from Cordova to Jaen eighteen miles W of Jaen

ALCEDO Kings-fisher In zoology a genus of the class aves, order picæ of Linnæus Its generic character is the following Bill triangular, thick, straight, long pointed, tongue fleshy, very short, flat, pointed feet, in most gressorial It chiefly frequents rivers and lives on fish, which it catches with curious dexterity, swallows its prey whole, but brings up the undigested part though short-winged, flies with great swiftness its predominant colour blue in different shades, nostrils small and, in most covered with feathers The alcedo contains upwards of forty species of which the chief are, 1 A cristata, crested kingsfisher, alluding two varieties 2 A formosa, splendid kingsfisher the most beautiful of the entire genus, with tail short, body yellowish-green shoulders, throat, and rump yellow wings, and crown, blue, bill yellowish horn colour, head with a bright yellowish stripe each side, including the region of the eyes, smaller wing-coverts edged with yellow, legs reddish brown An inhabitant of South America (See Nat Hist pl II, 3 A ispida, common kingsfisher 4 A purpurea, purple kingsfisher 5 A alcyon, belted kingsfisher of which there are four varieties 6 A cloroccphala, green headed king fisher

ALCERON, (Arab) The ricinus or castor berry

ALCES, in entomology, a species of lucanus

ALCES, in zoology, a species of Cervus See ELK

ALCESTER, or ALNCESTER, in ancient town of England, in the county of Warwick, situated at the union of the rivers Aln and Arrow, the principal manufacture is making needles the market is on Tuesday, and considerable for corn eight miles NW Stratford upon Avon, and 102 NW London

ALCHEMILLA Ladies mantle A genus of the class and order tetrandria monogynia Calyx eight cleft inferior every other segment smaller, corolless, seed one, naked It embraces six species of which three are common to our own pastures or mountains It was called alchemilla, because the herb was formerly much celebrated by old alchemists One of its species, a vulgaris still retains a place in some pharmacopœias, being esteemed a powerful astringent in hæmorrhages, fluor albus, and given internally

ALCHEMIST, one who professes or practises alchemy

ALCHEMY or ALCHYMY, a more refined or abstruse kind of chemistry, conversant about the mysteries of the art and assumed in the 12th century, by those adventurous philosophers who were engaged in the making of gold, and in searching for the philosopher's stone The term is unquestionably derived from the Arabic alchy, heavenly or divine and mi, like or resembling, i e something god like, heavenly, or divine And hence the word should rather be spelt alchymy than alchemy meaning the divine science of philosophy

From assuming too much however, the alchymists accomplished too little their ideas instead of being expanded by the grandeur of their pursuit, were concentrated about a single object, to the exclusion of every other and while the artists were supplying the wants of mankind by their useful exertions, the alchemists, with all their lofty pretensions, were constantly disappointed in their aim In order to support their reputation, they wrote books on their boasted science, so obscurely as to impart no instruction and in the exhibition of their experiments they employed tricks and evasions to deceive their spectators

But the term was not confined to the making of gold, and the search after the philosopher's stone, by which metals were said to be transmuted, for in the beginning of the sixteenth century, Paracelsus, a Swiss physician, who had performed many wonderful cures by chemical preparations, declared his opinion that a universal medicine might be discovered by alchymy Filled with this notion, he un

dertook the enquiry with all imaginable ardour, and was joined by others, who entered into his project with the most enthusiastic hopes of success Some, whose expectations had overpowered their judgment, actually fancied that they had made the wished for discovery, and assumed the title of Adepts, but further experience convinced them of their error, and obliged them to abandon their chimerical pursuit

The other objects of alchymy were, a universal dissolvent, or all thest which should dissolve all substances, and universal ferment, or a matter which being applied to any seed or substance shall increase its fecundity to infinity With these and similar extravagancies were the pretenders to wisdom deluded, in the darkness of the middle ages, nor was it till the middle of the sixteenth century that the mysteries of alchymy were exposed and confuted by Kircher, the Jesuit who wrote a noble work entitled Mundus Subterraneus and by the learned Conringius, whose abilities were displayed with much success and reputation By these efforts, the prevalence of alchymy was impeded and diminished, the charm by which it held its dominion over the mind was broken, and the system of benighted ignorance gave way to the light of real science Before, "a little truth was so diluted in a large quantity of falshood that it became invisible and inseparable to the few known properties of bodies fancy added others more dazzling, metals were supposed to sympathize with planets and with the different parts of the human body, and the greatest absurdities were reverenced, because they were enveloped in mysterious darkness, in which they were entrenched against the attacks of reason —But now, when the several parts of chemical knowledge began to be collected, examined, and compared, the true path of enquiry was discovered, and by the labours of Kircher and Conringius, together with those of their successors Barner, Bohnius, Becher, Stahl, Boerhaave and Macquer, the true foundation was established of that scientific chemistry, which has since been so much cultivated and improved, and of which a fuller account will be given under its proper article in this Dictionary See CHEMISTRY

It ought, however, to be remembered that though the pursuit of alchymy were the most preposterous that can be conceived, yet the ardour with which they were followed, the amazing number of experiments that were made, and the care that was taken to observe their results, contributed to the discovery of many facts, combinations, and properties, to which chemistry, even at this day, is highly indebted, and thus the activity of error was eventually favourable to the cause of truth

ALCHYMICAL adj (from *alchymy*) Relating to alchymy (*Camden*)

ALCHY'MICALLY ad (from *alchymical*) In the manner of an alchymist

ALCHYMIST s (from *alchymy*) One who pursues or professes the science of alchymy

ALCHYMY See ALCHEMY.

ALCIBIADES, an Athenian general, famous for his versatile genius, and natural foibles He was disciple to Socrates, whose lessons and example checked, for a time, his vicious propensities In the Peloponnesian wars he encouraged the Athenians to make an expedition against Syracuse He was chosen general in that war, and in his absence he was accused of impiety Upon this he fled, and stirred up the Spartans to make war against Athens, when this did not succeed, he retired to Tissaphernes, the Persian general Being recalled by the Athenians, he obliged the Lacedæmonians to sue for peace, made several conquests in Asia, and was received in triumph at Athens His popularity was of short duration, the failure of an expedition against Cyme exposed him again to the resentment of the people, and he fled to Pharnabazus, whom he almost induced to make war upon Lacedæmon This was told to Lysander, the Spartan general, who prevailed upon Pharnabazus to murder Alcibiades Two servants were sent for that purpose, and they set on fire the cottage where he was, and killed him with darts as he attempted to make his escape He died in the 46th year of his age, 404 B C after a life of perpetual difficulties His character has been cleared from the aspersions of malevolence by the writings of Thucydides

ALCIBIADES, in entomology See PAPILIO EQUES

ALCMAER, a town of the United Netherlands, in the state of Holland, situated near Schermeer, one of the largest lakes of North Holland, not much above a league from the sea, with a canal into the Ye, and thence to Amsterdam The land about the town was formerly full of morasses, but being now drained, is become exceeding good meadow land eight leagues NNW Amsterdam N lat 52 28 E lon 4 26

ALCMAN a lyric poet, who flourished in the 27th Olympiad He was born at Sparta, and composed several poems, of which only some fragments are remaining quoted by Athenæus and some other ancient writers He was very amorous, accounted the father of gallant poesy, and is said to have been the first that introduced the custom of singing love-songs in company He is reported to have been one of the greatest eaters of his age, upon which Mr Bayle remarks, that such a quality would have been extremely inconvenient if poetry had been at that time upon such a footing as it has been often since, not able to procure the poet bread He died of a strange disease, for he was eaten up with lice

ALCMANIAN in the ancient poetry, a kind of lyric verse, or metre, consisting of two dactyls, and two trochees Such e gr is

Virginibus puerisque canto

The word is formed from Alcman, the poet

ALCOHOL, or ALKOHOL, (from an Arabian word which signifies antimony, so called from the usage of the Eastern ladies to

paint their eyebrows with antimony, reduced to a most subtle powder, which thus came to signify any thing exalted to its highest perfection.) Ardent spirit, or what is vulgarly called spirit of wine, is, when pure, a highly rectified distillation of such liquors as have undergone the vinous fermentation, or it is the purely spirituous part of these liquors. It is the product of the saccharine principle, formed by the successive processes of vinous fermentation and distillation, and all fermented liquors will afford it. Though brandy, rum, arrack, malt-spirit and the like, differ much in colour, taste, smell, and other properties, the spirituous part, or alcohol, is the same in each. We shall state the chief properties of this fluid, the best methods of procuring it, and the modes by which its purity may be ascertained.

The chief properties of alcohol are the following:—It is a colourless transparent liquor, appearing to the eye like pure water, very moveable, and very light, an ounce phial being capable of holding no more than six drams and forty-eight grains of alcohol. Its smell is poignant and agreeable; its taste hot and pungent. From its great lightness and mobility, the bubbles which are formed on shaking it subside almost instantaneously. It is so exceedingly volatile as to be converted into a vapour by the heat of the hand, when exposed to the air, it is evaporated at the temperature of ten degrees above the freezing point, and leaves no residue except a little water when it is not quite pure, it boils at the temperature of about 165° Fahr., and the vapours when condensed return unaltered to their former state. It has never been frozen by any degree of cold produced by nature or art. Its specific gravity is about 0.825, and it is composed of carbon, hydrogen, and water.

When alcohol is heated in contact with air, it soon kindles and burns with a light flame, the middle of which is white and the edges blue; if it be pure, it burns in this manner without leaving any residue, and the flame is unaccompanied with noise or the emission of any unpleasant vapour.

Boerhaave observed that the vapour that escaped during this combustion, when collected, was found to be nothing but water. Juncker and Dr Black had made the same remark, and the latter suspected that the weight of the water exceeded that of the alcohol consumed. This conjecture was confirmed by Lavoisier, the first who analysed this substance, and who found that the water produced by the combustion of alcohol exceeded the alcohol consumed by about one seventh part.

Alcohol mixes with water in any proportion. During the mixture heat is extricated, which is sensible to the hand even in small quantities. At the same time there is a mutual penetration of parts, so that the bulk of the two liquors when mixed is less than when separate. The alcohol may be again separated from the water by distillation in a gentle heat. So strong is the affinity between these two fluids, that water is capable of separating alcohol from many of the other bodies which may be united with it; and again, alcohol decomposes most saline solutions, and precipitates the salts.—On these accounts alcohol has been applied, and with success, to the examination of mineral waters, the salts contained in which it precipitates without alteration. See WATERS, mineral.

Alcohol is capable of dissolving a great number of substances, which renders it highly useful in various processes and in analysis. With some of the weaker acids, as the boracic and tartaric, it forms mixtures without decomposition, and may be separated from them by evaporation.—With the stronger acids, it produces more powerful effects, and, in particular, with the three mineral acids, it forms sulphuric, nitric, and muriatic ether. (See ETHER.) The following substances are also soluble in alcohol, in different proportions. All the alkalies, when pure, several of the neutral, earthy, and metallic salts, ammonia, both pure and carbonated, carbonic acid gas, sulphur, when reduced with it into vapour, phosphorus, slightly, most of the vegetable acids, highly; sugar, readily, but the mucilage that is mixed with it, very slightly; the essential oils, and most odorous parts of vegetables, forming when distilled with alcohol, lavender water and other distilled spirits; all the resins and gum resins, forming tinctures, and resinous extracts; camphor, readily and in a great proportion; and the animal substances, wax, spermaceti, biliary calculi, &c.

On the contrary, alcohol will not dissolve or unite with the following substances:—the fixed alkalies when combined with carbonic acid, all the sulphates, both of the alkalies, earths, and metals; some of the nitrated metals, some of the muriated metals, metals and their oxides, and metallic acids, sulphur unless when it and the alcohol are in the state of vapour, all the pure earths, the fixed oils, unless when united with alkalies, or converted into drying oils, by metallic oxyds; muscular fibre, the coagulum of blood, and albumen.

Methods of preparing alcohol. In this country it is procured most plentifully from fermented grain liquors prepared for distillation, from grain, molasses, &c., but in the wine countries, it is obtained by distilling wine, whence it is called spirit of wine. M. Baumé gives the following directions for the separation of the alcohol:—"Put a quantity of brandy in the water bath of an alembic, and proceed to distillation. Set apart the first product of the distillation when it amounts to about a fourth part of the liquor put into the alembic. Then continue the process till about as much more is obtained, or till the liquor comes over white and milky. Then redistil the latter product, and mix the first half which comes over with the first part of the former distillation, and continue to distil as long as any spirit comes over. This latter portion may be again distilled, and the first product mixed with the former first products, as before. After each distillation, there remains in the alembic a watery liquor

which retains the smell of brandy, but is entirely deprived of inflammable spirit, and is thrown away as useless.

"Having thus procured all the spirit from the brandy, return all the reserved first products to the alembic, and distil with a gentle fire. When about half the liquor has come over, it should be kept apart as pure rectified alcohol, the remainder is to be distilled as long as it is inflammable, and may either be again rectified, or reserved for those purposes where a spirit of inferior strength is required."

Rouelle directs to extract, by distillation on the water bath, one half of the brandy made use of; this first product is common alcohol. By rectifying it twice, and reducing it about two thirds of its original quantity, the strongest alcohol is obtained: this, according to Kunckel, is to be again distilled with water, to separate the oil which is combined with it, after which it is perfectly pure. The residue of the brandy is nothing but water impregnated with some particles of colouring matter, with a peculiar oil floating on its surface.

Another method is as follows.—As the liquors from which alcohol is obtained generally contain it mixed with water and with a small quantity of a peculiar oil, the difficulty of making it pure consists in separating it from these substances. The alcohol may be freed from water by putting into the liquor (whether it be wine, or beer, or impure spirit), a quantity of well-dried potash, which will unite with the water, while the alcohol, mixed with a little of the potash, will swim at the top. This last is to be poured into another vessel and the operation repeated, till the potash is observed to be no longer very moist. Such spirit of wine is exceedingly strong, but rendered a little impure by the potash, as appears from its yellow colour. It must therefore be distilled to a fifth part over a slow heat: the four fifths that come over are pure alcohol.—Previous to distillation, it will be proper, in many cases, to add a little chalk, crumb of bread, bran, or other substance to remove the oil with which the alcohol is united.

To ascertain the purity of alcohol, various methods have been devised. It has been thought that the alcohol which burns readily and leaves no residue is very pure; but this test is not to be depended upon, for the heat produced is sufficiently strong to dry up a part of the water, or dissipate the phlegm it may contain; if the alcohol, however, be very weak and watery, it will not kindle at all. Another method is to drop a small quantity of spirit on gunpowder and kindle it. The spirit burns quietly on the surface of the powder till it is all consumed, and the last portion of it, if pure, sets fire to the powder; but if the spirit be watery, the powder becomes damp, and will not explode. This proof, also, is fallacious; for if any considerable quantity, even of the best alcohol, is poured on a little powder, the water which it affords as it burns moistens the powder, and prevents it from kindling; and if it be only barely moistened, any spirit that will burn will inflame it. Boerhaave employed dry powdered potash, which he cast into the alcohol under examination, and if it contained a superabundance of water, the alkali would unite with the water, and sink to the bottom. But the most accurate method is to find its specific gravity by means of an instrument contrived by Baume, called an Areometer, and compare it with the density of known quantities of alcohol and water previously mixed for the purpose.

The uses of alcohol are very numerous and extensive. In addition to those mentioned above which relate to various instances of chemical analysis, to the examination of mineral waters and of many animal and vegetable substances, it is subservient to a number of useful purposes in the arts and in medicine.

It is employed largely in combination with copal resin, oil of spike, oil of turpentine, &c. to form varnishes. From its antiseptic power, it is well calculated to preserve bodies in anatomical preparations. Its gentle and steady heat, unaccompanied with smoke, renders it eligible for burning in lamps; and the impossibility of freezing it in any known degree of cold, shews it to be well adapted for indicating the lower degrees of temperature in the thermometer. Distilled spirituous waters are formed by a combination of alcohol with the aroma of plants.

Alcohol, either pure or mixed with camphor, is used to stop by external application the progress of gangrenes. Distilled spirituous waters are often administered as tonics, cordials, antispasmodics, stomachics, &c. either diluted in water, or sweetened with syrups. Tinctures, which are a solution of the more active parts of vegetables in alcohol, possess nearly the same qualities, but they act with more energy.

The vapour of alcohol, transmitted through an earthen tube, forms the singular air, called OLEFIANT GAS, which see.

ALCOHOL is also used for a very fine impalpable powder which women in the east make use of as a kind of fucus. Kohol is a general term denoting a substance applied to the eyeball on the inside of the eyelids, in the form of a powder finely levigated. That which is employed for ornament and is principally antimony, is called simply alcohol or isphahany; when other ingredients are added, on account of some particular disorders, the kohol is distinguished by some appropriate epithet. The ladies of Barbary tinge their hair, and the edges of their eyelids with al-kahol, the powder of lead ore. The kohol is also used by the men for strengthening the sight and preventing disorders of the eye, for which purpose different ingredients are occasionally added. It is also applied to the eyes of children as soon as they are born, and continued at intervals of a few days, until they arrive at maturity. The use of the kohol is very ancient, and various parts of sacred history are supposed to refer to it. Gen. xlix. 12. and Lowth on Isaiah, note to chap. iii. v. 16.

ALCOHOL MARTIS, filings of steel reduced

to an impalpable powder, by turning into rust with urine, levigating, washing, and drying it. It was formerly used as a remedy in the gout.

ALCOHOLIZATION, the rectification of a vinous spirit. It is otherwise called alcoolization; and is sometimes used for pulverization.

ALCOLA, among alchemists, the tartar of urine, is found in three different forms, 1. Resolved, or reduced into an impalpable substance, 2. Sandy, 3. Mucilaginous, or viscous.

ALCOR, the Arabian name for the small star very near alioth in ursa major. The Arabians apply a proverb to those who pretend to see small things while they overlook much greater:—Thou canst see alcor, and yet not see the full moon.

ALCORAN, or AL-KORAN, the scripture, or bible of the Mahometans. The word is compounded of the Arabic al, a noun signifying God, or a particle signifying coran or koran, derived from the verb cara or kara, to read; and may hence mean either "God's book," "the book of God," or emphatically "the book;" the first is the best interpretation. The Alkoran is divided into 114 larger portions of very unequal length, which we call chapters, but the Arabians sowar. These chapters are not, in the manuscript copies, distinguished by their numerical order, but by particular titles, which are taken sometimes from a particular matter treated of, or person mentioned therein, and some chapters have two or more titles, occasioned by the difference of the copies. Every chapter is subdivided into smaller portions of very unequal length, with us called verses, but in Arabic ayat, the same with the Hebrew ototh, signifying signs or wonders, such as the secrets of God, his attributes, &c. Many of these have their particular titles also.

Besides these unequal divisions of chapter and verse, the Mahometans have also divided their Alkoran into 60 equal portions, which they call Ahzab, in the singular Hizb, each subdivided into four equal parts, which is an imitation of the Jews, who have an ancient division of their Mishna into 60 portions called Massictoth.

Next after the title, at the head of every chapter, except only the 9th, is prefixed the following solemn form by the Mahometans called the Bismallah, In the name of the most merciful God, which form they constantly place at the beginning of all their books and writings in general, as a peculiar mark or distinguishing characteristic of their religion, it being counted a sort of impiety to omit it. Mahomet probably took this form, as he did many other things, from the Persian Magi, who used to begin their books in these words, Benam Yezdan bakshaishgher dadar, that is, In the name of the most merciful just God.—There are 29 chapters of the Alkoran, which have this peculiarity, that they begin with certain letters of the alphabet, some with a single one, others with more. These letters the Mahometans believe to be the peculiar marks of the Alkoran, and to conceal several profound mysteries, but they have been explained by writers in many different ways.

The Alkoran is universally allowed to be written with the utmost elegance and purity of language, and is confessedly the standard of the Arabic tongue. Indeed the more orthodox believe, and are taught by the book itself to consider it inimitable by any human pen: a permanent miracle, greater than that of raising the dead, and alone sufficient to convince the world of its divine original. To this miracle, in fact, did Mahomet himself chiefly appeal for the confirmation of his mission, publicly challenging the most learned men in Arabia to produce even a single chapter that might be compared with it.

The general design of the Alkoran was to unite the professors of the three different religions, then followed in the populous country of Arabia, in the knowledge and worship of one God, under the sanction of certain laws, and the outward signs of ceremonies partly of ancient and partly of novel institution, enforced by the consideration of rewards and punishments both temporal and eternal, and to bring them all to the obedience of Mahomet, as the prophet and ambassador of the deity.

The great doctrine then of the Alkoran is the unity of God; to restore which point Mahomet pretended was the chief end of his mission; it being laid down by him as a fundamental truth, that there never was, nor ever can be, more than one true orthodox religion. Whenever this religion became neglected or corrupted in essentials, God, he asserted, had the goodness to reinform and readmonish mankind thereof, by several prophets, of whom Moses and Jesus were the most distinguished, till the appearance of Mahomet, who is their seal, and no other to be expected after him. The more effectually to enforce this idea, a great part of the Alkoran is employed in relating examples of dreadful punishments formerly inflicted by God on those who rejected and abused his messengers, several of which stories, or some circumstances of them, are taken from the Old and New Testaments, but many more from the apocryphal books and traditions of the Jews and Christians of those ages. Indeed, few or none of the relations or circumstances in the Alkoran were invented by Mahomet, as is generally supposed, it being easy to trace the greatest part of them much higher, as the rest might be, were more of those books extant, and were it worth while to make the enquiry.

The rest of the Alkoran is taken up in prescribing necessary laws and directions, frequent admonitions to moral and divine virtues, the worship and reverence of the Supreme Being, and resignation to his will. One of their most learned commentators distinguishes the contents of the Alkoran into allegorical and literal; under the former are comprehended all the obscure, parabolical, and enigmatical passages, with such as are repealed, or abrogated; the latter, such as are clear, and in full force.

The most excellent moral in the whole Al- [illegible]

Al Araf, viz. shew mercy, do good to all, and dispute not with the ignorant. Mahomet, according to the authors of the Keschaf, having begged of the angel Gabriel a more ample explication of this passage, received it in these terms; "Seek him who turns thee out, give to him who takes from thee, pardon him who injures thee, for God will have you plant in your soul the roots of his chief perfections." It is evident, this commentary is copied from the gospel. But it matters not so much who had it first, as he who observes it best. The caliph Hassan, son of Hali, being at table, a slave unfortunately let fall a dish of meat reeking hot, which scalded him severely. The slave fell on his knees, rehearsing these words of the Alcoran, "Paradise is for those who restrain their anger." I am not angry with thee, answered the caliph.—"And for those who forgive offences against them," continues the slave. I forgive thee thine, replies the caliph.—"But above all, for those who return good for evil," adds the slave. I set thee at liberty, rejoined the caliph, and I give thee ten dinars.

It is beyond dispute that Mahomet was really the chief contriver of the alcoran, though it is probable, that he had assistance in his design from others, particularly from one Sergius, a Nestorian monk, and a Jew named Abdallah Ebn Salam. The Mahometans, however, deny that the alcoran was composed either by their prophet himself, or any other person, it being their orthodox belief, that it is not only of divine original, but even eternal and uncreated, remaining, as some of them express it, in the very essence of God; that the first transcript has been from everlasting by God's throne, written on a table of vast bigness, that a copy from this table, in one volume on paper, was, by the ministry of the angel Gabriel, sent down to the lowest heaven in the month of Ramadan, whence Gabriel revealed it by parcels, some at Mecca, and some at Medina, at different times during the space of twenty years, as the exigency of affairs required, giving Mahomet, however, the satisfaction of seeing the whole once a year. They add, that this original copy was bound in silk, adorned with gold and precious stones of Paradise.

ALCORANISTS, among Mahometans, those who adhere strictly to the letter or text of the alcoran, from an opinion of its ultimate sufficiency and perfection. The Persians are generally alcoranists, as admitting the alcoran alone for their rule of faith. The Turks, Tartars, Arabs, &c. besides the alcoran, admit a multitude of traditions.

ALCOVE (*alcova*, Span.) A recess, or part of a chamber, separated by an estrade, in which is placed a bed of state (*Trevoux*). This word is also used for an enclosed garden seat.

ALCUINUS (Flaccus,) an ecclesiastic of the eighth century. Where he was born, is a matter of dispute, but, according to the most probable opinion, it was in Yorkshire. It is pretty certain, however, that he was educated first under Bede, and afterwards by Egbert archbishop of York, by whom he was made keeper of the library of that city. He thence rose to be deacon of the church, and afterwards became abbot of Canterbury. In the year 793 he went over to France, upon the invitation of Charlemagne, by whom he was greatly caressed, and amply provided for. He was not only honoured with his friendship and confidence, but became his instructor in rhetoric, logic, mathematics, and divinity. He attended him to the council of Francfort, and, at his return, was presented with the abbeys of Ferrara, St Jodocus, and St Lupus. He retired at last to the abbey of St Martin at Tours, where he spent the latter part of his life, and died in the year 804. Doubtless, he was one of the best scholars and wisest men of his time. France was chiefly indebted to him for her improvements in literature. The universities of Paris, Tours, Fulden, Soissons, and many others, owe to him their origin and increase; and to him was owing the institution of learned academies, at least the first one we read of was set on foot by the emperor at his instigation. His works were collected and published by Andrew du Chesne in one volume folio, Paris, 1617. They consist of, 1. Tracts upon scripture. 2. Tracts upon doctrine, discipline, and morality. 3. Historical treatises, letters, and poems. Since this edition, there has been published an incredible number of tracts, poems, &c. ascribed to this author, most of which in all probability, were not his.

ALCYONE, in entomology, a species of the papilio nymphalis.

ALCYONIUM. In zoology, a genus of the class vermes, order zoophyta of Linnéus, and is thus characterised, an animal substance generally growing in the form of a plant, stem fixed, fleshy, gelatinous, spongy, or coriaceous, beset with polype-bearing stellate cells. Its known species are twenty-eight, of which the following are chiefly entitled to notice.—1. A. arboreum. Arborescent alcyonium: stem arborescent, with obtuse branches and papillary pores. It is through these pores it imbibes its nutriment. It inhabits the Indian and North seas, and grows to six or seven feet in height: flesh thick, rosy, with tubercles unequally disposed, within more yellow, with a whitish harder substance resembling the bony part of a Gorgonia, branches very rugged and irregular. —2. A. digitatum. Dead man's hand: without stem, oblong, lobed, of a coriaceous wrinkled substance, covered with minute papillæ. It is an inhabitant of the coasts of Europe; adheres to stones and shells: of a pale reddish grey without, whitish within, and covered with stellate papillæ protruding to polypes with eight claws.—3. A. Bursa. Sea-purse.—4. A. Ficus. Sea-fig.—5. A. Gelatinosus. Pudding-weed.

Alcyonium stagnum, (anc. geog.), a lake in the territory of Corinth, whose depth was unfathomable, and in vain attempted to be discovered by Nero; through this lake Bacchus is said to have descended to hell, to bring back Semele (Pausanias).

ALCYONIUS (Peter,) a learned Italian, who flourished in the sixteenth century He was well versed in the Greek and Latin tongues, and wrote some pieces of eloquence, which met with great approbation He was corrector of the press a considerable time for Aldus Manutius, and is entitled to a share in the praises given to the editions of that learned printer He published a treatise concerning banishment

ALDBOROUGH, a borough and seaport in Suffolk, with a market on Wednesday and Saturday It is pleasantly seated in a dale between a high hill and the sea The harbour is small, and the sea has, some years back, made great encroachments This town sends two members to parliament Lat 52 16 N Lon 1 42 E

ALDBOROUGH, is also the name of a borough town in Yorkshire, sending two members to parliament Lat 54 8 N Lon 1 12 W

ALDEBARAN, in astronomy, a star of the first magnitude, often called the Bull's eye, and is marked by Bayer as α in Taurus

ALDER In botany See BETULA

ALDER, black, or berry-bearing See RHAMNUS

ALDIRAIMIN, in astronomy, a star of the third magnitude, marked α in the right shoulder of Cepheus

ALDERHOLM, an island of Sweden, at the mouth of the river Gefle, in the gulf of Bothnia.

ALDERLIEVEST a Most beloved (*Shakspeare*).

ALDERMAN, among our ancient Saxon ancestors, was the second of the three orders, or degrees, of nobility The word, in its original, is ealdorman, compounded of æld, old; or ældor, elder, and man, q d Elderman Atheling was the first rank of nobility, alderman the second, and thane the lowest

ALDERMAN, in the British policy, a magistrate subordinate to the mayor of a city or town-corporate The number of these magistrates varies according to the magnitude or custom of the place, London has twenty-six, each having the care of one of the wards of the city. All the aldermen are justices of the peace by a charter of 15 Geo II The aldermen of London, &c are exempted from serving inferior offices, nor shall they be put upon assizes, or serve on juries so long as they continue to be aldermen An alderman ought to be an inhabitant of the place, and resident where he is chosen; if he remove he is incapable of doing his duty in the government of the place, and may be disfranchised

ALDERMANLY, ad. (from *alderman*,) Like an alderman (*Swift*).

ALDERN a (from *alder*.) Made of alder (*May*.).

ALDERNEY, an island in the British Channel, subject to Great Britain about a league and a half from Cape la Hogue in Normandy thirty leagues north-west part It is separated from Normandy by a strait called the Race, which is a very dangerous passage, by reason of the rocks under water It is a healthy island, and its pasture and corn are good. The inhabitants are poor, principally occasioned by the prevailing custom of gavel-kind, by which the lands are equally divided into parcels among the last proprietor's children. Lat 49 50 N Lon 2 17 W

ALDHAFFRA, in astronomy, a star of the third magnitude, being γ in Leo

ALDHELM, or ADELM (St), an English divine, was bishop of Shireburn in the time of the Saxon heptarchy William of Malmesbury says, that he was the son of Kenred, or Kenter, brother of Ina king of the West Saxons He was born at Caer Bladon, now Malmesbury, in Wiltshire He had part of his education abroad in France and Italy, and part at home under Maildulphus an Irish Scot, who had built a little monastery where Malmesbury now stands Upon the death of Maildulphus, Aldhelm, by the help of Eleutherius bishop of Winchester, built a stately monastery there, and was himself the first abbot thereof When Hedda bishop of the West Saxons died, the kingdom was divided into two dioceses, viz Winchester and Shireburn, and King Ina promoted Aldhelm to the latter, comprehending Dorsetshire, Wiltshire, Devonshire, and Cornwall he was consecrated at Rome by pope Sergius I and Godwin tells us that he had the courage to reprove his holiness for having a bastard Aldhelm, by the directions of a diocesan synod, wrote a book against the mistake of the Britons concerning the celebration of Easter, which brought over many of them to the catholic usage in that point He likewise wrote a piece, partly in prose and partly in hexameter verse, in praise of virginity, dedicated to Ethelburga abbess of Barking, and published amongst Bede's Opuscula, besides several other treatises, which are mentioned by Bale and William of Malmesbury He is said to have been the first Englishman who ever wrote in Latin and as he himself tells us in one of his treatises on metre, the first who introduced poetry into England The character of Aldhelm is thus depicted by an ancient chronicler, "He was an excellent harper, a most elegant Saxon and Latin poet, a "doctor egregius," and admirably versed in the Scriptures and liberal sciences" Indeed, Alfred the Great declared that Aldhelm was the best of all the Saxon poets, and that a favourite song which was universally sung in his time, nearly 200 years after the author's death, was of his composition Aldhelm lived in great esteem till his death, which happened May the 25th, 709

ALDII, in antiquity, servants who attended their masters to the wars

ALDRICH (Henry), was the son of Henry Aldrich, of Westminster, where he was born in 1647 He was educated at Westminster, from whence he went to Christ church, Oxford, in 1662 He was elected student of that college, and, in 1669, took the degree of M A. At the revolution he was made dean of Christ church. He was one of the persons entrusted

with the publication of lord Clarendon's history Besides his literary acquirements, he had a great knowledge of architecture and music, as appears by Peckwater-square, in Oxford, the chapel of Trinity-college, and the church of All-Saints, which was designed by him, and the numerous church services and anthems which he composed The dean was also the composer of two catches, the famous one called "Hark the bonny Christ Church Bells," and the other "A smoking Catch," being himself a great smoker He held with his deanery, the rectory of Wem, in Shropshire, and in the convocation of 1702, he sat as prolocutor He died at Christ-church, December 14, 1710 Besides the works already mentioned, he printed "Artis Logicæ Compendium," and the Elements of Architecture, in Latin

ALDROVANDA In botany, a genus of the class and order pentandria, pentagynia Its calyx is five parted, petals five, capsule five-valved, one-celled, ten-seeded The only known species is indigenous both to Italy and India, bladdered like utricularia, but in bunches

ALDROVANDUS (Ulysses), professor of philosophy and physic at Bologna, the place of his nativity, was a most curious enquirer into natural history, and travelled into the most distant countries on purpose to inform himself of their natural productions He was at great expence in having figures drawn from the life Aubert le Mire says, that he gave a certain painter, famous in that art, a yearly salary of two hundred crowns, for thirty years and upwards, and that he employed at his own expence Lorenzo Bennini and Cornelius Swintus, as well as the famous engraver Christopher Coriolanus These expenses ruined his fortune, and at length reduced him to the utmost necessity, and it is said that he died blind in a hospital at Bologna, at a great age, in 1605

Mr Bayle observes, that antiquity does not furnish us with an instance of a design so extensive and so laborious as that of Aldrovandus, with regard to natural history, that Pliny indeed has treated of more subjects, but only touches them lightly, whereas Aldrovandus has collected all he could meet with His compilation, or what at least was compiled upon his plan, consists of several volumes in folio, some of which were printed after his death He himself published his Ornithology, or History of Birds, in three folio volumes, in 1599, and his seven books of Insects, which make another volume of the same size The volume of Serpents, three of Quadrupeds, one of Fishes, that of exsanguineous Animals, the History of Monsters, with the supplement to that of Animals, the treatise of Metals, and the Dendrology or History of Trees, were published at several times after his death, by the care of different persons

ALE, a fermented liquor obtained from an infusion of malt, differing from beer chiefly in having a less proportion of hops See BREWING

This liquor, the natural substitute of wine in such countries as could not produce the grape, was originally made in Egypt The natives of Spain also, the inhabitants of France, and the aborigines of Britain, all used an infusion of barley for their ordinary liquor, and it was called by the various names of cælia and ceria in the first country, cerevisia in the second, and curmi in the last, all literally importing only the strong water

The method in which the ancient Britons, and other Celtic nations, made their ale, is thus described by Isidorus and Orosius "The grain is steeped in water and made to germinate by which its spirits are excited and set at liberty, it is then dried and ground, after which it is infused in a certain quantity of water, which being fermented, becomes a pleasant, warming, strengthening, and intoxicating liquor"

The consumption of ale in these kingdoms is incredible It was computed thirty years ago at the value of 4,000,000 pounds yearly, including Great Britain and Ireland The duties on ale and beer make a principal branch of the revenue in Britain They were first imposed by the 12th of Car II and have been continued by several subsequent acts of parliament to first Geo III which lays an additional duty of 3d per barrel In the whole, the brewer of ale and beer for sale shall pay 8s for every barrel of either, above 6s a barrel, and for every barrel of 6s or under, the sum of 1s 4d Additional duties were laid on in 1803

ALE-HOUSES must be licensed by justices of the peace, who take recognizances of the persons licensed, and of their sureties, viz. 10l each, that they will not suffer unlawful gaming, or other disorderly practices in their houses Every person, excepting those who sell ale in fairs, neglecting to procure a licence, is liable to a penalty of 40s for the first offence, 4l for the second, and 6l for the third, with all costs The licence is granted on the first of September, or within 20 days after, at a general meeting of the justices for the division to which he belongs, upon his producing a certificate to his character, unless, by living in a city or town corporate, this last circumstance is dispensed with, and continues in force for one year only Ale house keepers, selling ale in short measure, are liable to a penalty not exceeding 40s and not less than 10s. and likewise to a fine of 10s for permitting tippling, &c

ALE-MEASURE See MEASURE.

ALEA, in Roman antiquity, signifies, in general, games of chance The place where these games were played was called Aleatorium

ALEANDER (Jerome), cardinal and archbishop of Brindisi, was born in 1480, and distinguished himself at the beginning of the Reformation, by the opposition he made to Luther for being sent into Germany as the pope's nuncio in 1519, he acted, as occasion served, in the character both of ambassador and doctor, and declaimed three hours together against Luther's doctrine before the diet

of Worms, but could not prevent that celebrated reformer from being heard in that diet. He published several works, and died at Rome in 1542.

ALEBERRY, s. (from *ale* and *berry*.) A beverage made by boiling ale with spirits and sugar, and sops of bread. (*Beaumont*.)

ALEBREWER, s. (from *ale* and *brewer*.) One that professes to brew ale. (*Mortimer*.)

ALECONNER, s. (from *ale* and *con*.) An officer in the city of London, whose business is to inspect the measures of public houses.

ALECOST. See TANACETUM.

ALECTOROMANTIA (from *ἀλεκτωρ*, *a cock*, and *μαντεια*, *divination*.) An ancient kind of divination by means of a cock, called also Alectryomancy, of which there appear to have been different species. But that most spoken of by authors was in the following manner. A circle being described on the ground, and divided into twenty-four equal portions, in each of these spaces was written one of the letters of the alphabet, and on each of the letters was laid a grain of wheat, after which, a cock being turned loose in the circle, particular notice was taken of the grains picked up by the cock, because the letters under them, being formed into a word, made the answer desired. It was thus, according to Zonaras, that Libanius and Jamblicus sought who should succeed the emperor Valens, and the cock eating the grains answering to the space ΘΕΟΔ, several whose names began with those letters, as Theodotus, Theodistes, Theodulus, &c. were put to death, which did not hinder, but promote, Theodosius to the succession. But the story, however current, is but ill supported: it has been called in question by some, and refuted by others, from the silence of Marcellinus, Socrates, and other historians of that time.

ALECTRA. In botany, a genus of the class and order didynamia angiospermia. Calyx two-lipped, the upper lip cloven, lower three-cleft; corol funnel-form, filaments bearded, capsule two-celled, double, seeds solitary. The only known species is a native of the Cape, with spiked yellow flowers streaked with purple.

ALEGAR, s. (from *ale* and *aigre*, Fr.) Sour ale.

ALE-HOOF, in Botany. See GLECHOMA.

ALEMANNIA, or ALEMANIA, in ancient geography, a name given to Germany, which was not known before the time of the Antonines, and then the name applied only to a part of it.

ALEMBERT (John le Rond d'), an eminent French philosopher, was born at Paris in 1717. He derived the name of John le Rond from that of the church near which, after his birth, he was exposed as a foundling. He re[illegible] his first education in [illegible] college of the [illegible]ations, among the [illegible]ists, but, on [illegible]t, found himself [illegible] unconnect[illegible] world, and sought [illegible] him in the [illegible] his nurse. Here [illegible] [illegible]ed himself [illegible] study of geometry, and [illegible] during the space of 40 years, with the greatest simplicity, discovering the augmentation of his means only by increasing displays of his beneficence, concealing his growing reputation and celebrity from these honest people, and making their plain and uncouth manners the subject of good-natured pleasantry and philosophical observation. His good nurse perceived his ardent activity, and heard him mentioned as the writer of many books, but never took it into her head that he was a great man, and rather beheld him with a kind of compassion. "You will never," said she to him one day, "be any thing but a philosopher—and what is a philosopher?—a fool, who toils and plagues himself during his life, that people may talk of him when he is no more." In 1741, he was elected into the academy of sciences, and two years after published his treatise on dynamics. In 1746, the prize medal was decreed to him by the academy at Berlin, for a discourse on the theory of winds. In 1749, he solved the problem of the precession of the equinoxes, ascertained its quantity, and explained the rotation of the terrestrial axis. In 1752 he published an essay on the resistance of fluids, and soon after he obtained a pension from the king, through the good offices of count d'Argenson. He next engaged with Diderot in compiling the celebrated Encyclopédie, for which he wrote the preliminary discourse. While engaged on mathematical subjects his name was not much known, but now he became celebrated by works of an historical and miscellaneous nature, such as his "Philosophical, Historical, and Philological Miscellanies," "The Memoirs of Christina, Queen of Sweden," and his "Elements of Philosophy." The king of Prussia offered him a situation at his court, and the office of president of his academy, and the empress of Russia courted him into her dominions as tutor to the grand duke, but d'Alembert refused both these offers. In the year 1765, he published his dissertation on the destruction of the Jesuits, which brought upon him a host of enemies. He also published nine volumes of memoirs and miscellaneous pieces, entitled, Opuscules, and the Elements of Music. In 1772 he was elected secretary to the French academy, and set himself about writing the lives of the deceased academicians, of which he composed seventy. He died October 29, 1783, aged 66 years.

The talents of D'Alembert as a mathematician and natural philosopher, are universally admitted. His scientific works exhibit a singular combination of genius, judgment, and literary taste; he traversed almost every department of science with nearly unrivalled success, and added much to the general stock of knowledge, by communicating to the world the result of his profound researches. But the versatility of his talents would not admit of his exertions being confined to the promotion of science in general: he ranged much farther, and it is to be lamented that he did. It is deeply to be regretted that the admiration which will ever be excited by genius and

acquirements such as those of D'Alembert, must be chilled by the reflection that they were too frequently prostituted by endeavouring to disseminate the comfortless and restless principles of infidelity principles which, under a fair garb of philanthropy and good-will, tend ultimately, if not directly, to rob the fair face of nature of the impression of Deity, to untwist the bonds of society, and to convert mankind into a den of despairing mortals, or perhaps a horde of assassins

For an entire list of the writings of this extraordinary man, we refer to Dr Hutton's Math. and Phil Dict vol 1 p 62

ALEMBIC (from the Arabic *alembyc*) One of the simplest and most antient vessels employed in distillation It is not at present much used in England, the retort and still having been adopted in its stead, but in France and many parts of the continent, it continues to be the favourite vessel for distillations in the large way The most frequent use of alembics is for distillations of very volatile principles drawn from several substances, particularly from vegetables When the principles intended to be procured by distillation are such as do not act upon metals, and when they will rise with a degree of heat equal to, or very little exceeding, the heat of boiling water copper alembics are employed, having their internal surfaces well tinned, but when acid and saline substances, which attack metals, are to be distilled it is necessary to make use of glass alembic There are several parts belonging to most alembics, as well as several kinds of alembics, differing from each other in form and substance all which may be understood from the following description, and references to Pl 11

Fig 1 *A glass Alembic* A, the cucurbit, so called from the resemblance of their original form to a gourd or bladder this part contains the matters to be distilled, or else water in which is immersed another smaller vessel of the same form, to contain the matters for distillation in a water bath, B, the head, or capital in the shape of a hollow cone which is furnished with a gutter or channel C, placed along its inner and lower circumference, D, the beak, which opens inwardly into the gutter it ought to be from 15 to 18 inches long, and so inclined as to make with the neck of the alembic an angle of about 60 degrees

Fig 2 *A long neck glass Alembic* A, the body of the matrass, the use of which is the same as that of the cucurbit above, viz to contain the matters to be distilled, B the neck of the matrass, C the head of the alembic, with its gutter and beak The construction of this alembic is very ineligible, as the distance between the body and the capital is so great, that much of the heat must be lost before the vapour arrived at this part to be condensed, but this was one of the ill contrivances of the alchemists, who thought that the greater the distance was through which the vapour passed, the more perfectly would it be rectified

Fig 3 *A glass Alembic consisting of one piece* A, the cucurbit, B the head; C the aperture in the head, D its stopple, E the mouth of the cucurbit Though this construction has some advantages, it has one great inconvenience, viz the difficulty of introducing and extracting solid matters

Fig 4 *A copper Alembic* A the body or cucurbit, B the neck, C the head, D the beak or spout, E the refrigeratory or cooler, containing cold water for the purpose of condensing the vapour as it rises into the capital C, from whence it passes through D into the receiver the water in the refrigeratory must be renewed as often as is necessary, F a cock to let off the water from the refrigeratory, G the receiver to contain the product of distillation

Fig 5 *A metallic Alembic, as improved by Baumé and Chaptal* The different parts of this, and the nature of its construction, may be more easily understood by referring also to Fig 6 A the boiler a hollow cylinder of tinned copper, is of equal diameter at top and bottom but bulging out into a shoulder at *g*, by which it is suspended over the furnace (Fig 6), in this part are two handles *a a*, and a short pipe *f*, fitted with a cork, and used for supplying water, &c B a cucurbit, or balneum mariæ, made of tin, with two handles, and a collar on the outside to support it when fitted into the inner groove *b* of the boiler, C a section of the capital, near the bottom of which is a collar *s*, by which it is fixed on the inner groove *h* of the cucurbit B, *k* is the proper capital, made of tin, and having its base terminated by a circular channel *t*, a little inclined towards the beak *m*, *o* is the refrigeratory made of copper, and surrounding the capital, at the bottom of it is a stop-cock *p* When a brisk boiling heat is required, the liquor is put into the boiler, and the cucurbit omitted, but where the heat is required to be more moderate and uniform, the substance to be distilled is put into the cucurbit, and the boiler is furnished with as much water as will reach to the cucurbit, and thus transmit the heat regularly

The chief difference between an alembic and a still is in the construction of the head or capital, which in the alembic is designed not merely to collect, but to condense the vapour, whereas the head of a still serves merely to collect the vapour which is transmitted in an elastic state through the beak, and is condensed in the worm Most of the French brandies are prepared in alembics, but all British spirits in stills The advantages of the former are, that it requires less fuel, and is not likely to render the spirit empyreumatic, those of the latter consist in being more expeditious, in requiring less accuracy in the temperature of the cooler, and less water for the condensation of a given quantity of vapour For a further account of the process of DISTILLATION, see that word, and also the article STILL, in this Dictionary.

ALEMBROTH in the writings of alchemists, a word used for a sort of fixed alkaline salt, which had the power of the famous alkahest in dissolving bodies, and opening the pores of all known substances The general idea which the word appears to convey, is that of

a flux or solvent, either to assist in the fusion of metallic ores or earths, or to dissolve obstructions, and attenuate viscid humours in the human body, when employed medicinally The term is used by chemists to denote a compound of corrosive mercury and sal ammoniac, it is then called

ALEMBROTH SALT, and is generally the form in which corrosive sublimate is administered internally in diseases which require the use of this active medicine Its properties will be given under the term MURIATE OF MERCURY

ALENGTH ad (from *a* for *at*, and *length*.) At full length, along

ALENTEJO, a province of Portugal, situated between the rivers Tagus and Guadiana bordering on Spain, about thirty-six leagues long, and thirty-four broad It is, from its fertility, called the granary of Portugal The principal towns are Evora, Elvas, Campo-Mayor, Olivença, Villa-Viciosa, Estremos, Moura, Castello-do-Vide, Mouraon, Serpa, and Aronches

ALENZON, or ALENCON, a large handsome town of France, said to contain 10,000 inhabitants, in the department of Orne Lat 48 18 N Lon 0 10 E

ALEPPO, or HALAB, the capital of the Pachalic, and of all Syria, and the ordinary residence of the pacha, is situated in the vast plain which extends from the Orontes to the Euphrates, and which towards the south terminates in the desert It is built on eight hills or eminences, on the highest of which the castle is erected, and is supposed to be the ancient Beræa It is supposed to contain 300,000 inhabitants Lat 35 45 N Lon 37 20 E

ALEPPO (Old), is computed to be about twelve miles south of the present Aleppo

ALERT a (*alerte*, Fr) 1 Watchful, vigilant, ready at a call 2 Brisk, pert, petulant (*Addison*)

ALERTNESS s (from *alert*) The quality of being alert, sprightliness, pertness (*Addison*)

ALES (αλς) 1 Salt 2 Any substance dried, rigid, and contracted by heat, as though pickled with salt

ALETON, a word used by Hippocrates, to denote meal

ALETRIS In botany, a genus of the class and order hexandria monogynia Corol funnel-form, wrinkled, stamens inserted on the base of the segments, capsule three-celled, the cells many-seeded There are two species, one furnished by Africa and the other by North America It is often confounded with other genera of the same order, and hence its species appear to be more numerous

ALEURITES. In botany, a genus of the class and order monœcia monadelphia Calyx three-cleft, corol five-petalled, nectaries five-... Male stamens numerous, united on ... receptacle Female, styleless two, ... berry globular, seeds ... with a double bark The only ... is a native tree of New South

ALEUTIAN, or ALEUTSKY ISLANDS, a group or chain of islands, on the north-east of Kamschatka, and near the continent of America, belonging to Asiatic Russia They were partly discovered by Behring in 1741.

ALEWASHED a (from *ale* and *wash*) Soaked in ale (*Shakspeare*)

ALEWIFE s (from *ale* and *wife*.) A woman that keeps an alehouse (*Swift*)

ALEXANDER THE GREAT, king of Macedonia His father Philip laid the plan of that extensive empire, which his son afterwards established The character and exploits of this hero are however so familiar to every body, that it is needless labour to dwell on them All the world knows, says Mr Bayle, that he was a composition of very great virtues and very great vices He had no mediocrity in any thing but his stature in his other properties, whether good or bad, he was all extremes His ambition rose even to madness, and his father was not at all mistaking in supposing the bounds of Macedon too small for his son for how could Macedon bound the ambition of a man, who reckoned the whole world too small a dominion? And yet the vast aims of this mighty conqueror, if seen under another point of view, may appear to have been confined in a very narrow compass, since, as we are told, the utmost wish of that great heart, for which the whole earth was not big enough was, after all to be praised by the Athenians for it is related that the difficulties which he encountered in order to pass the Hydaspes forced him to cry out, "O Athenians, could you believe to what dangers I expose myself for the sake of being celebrated by you! Hence it is evident, he wanted to make all future time his own, and to be deemed an object of admiration to the latest posterity, yet did not expect this from the conquest of worlds, but from books He was perfectly right, says Bayle, "for if Greece had not furnished him with good writers, he would long ago have been as much forgotten as the kings who reigned in Macedon before Amphitryon"

Alexander was born at Pella, in the 356th year before Christ, and was educated by Aristotle he died at Babylon, in consequence of a drunken debauch, in the thirty-second year of his age, after a reign of twelve years and eight months

ALEXANDER SEVERUS, emperor of Rome, succeeded Heliogabalus about A D 222, when but sixteen years of age His mother's name was Mammæa, and by her advice he in a great measure regulated his conduct He applied himself to the reformation of abuses, the state having been greatly disordered by the vicious conduct of his predecessor, he was a most strict lover of justice, an encourager of learning and learned men, and favourable to the Christians. He made a successful expedition against the Persians, but endeavouring to reform his troops, who had grown very licentious ... the late bad government, they murdered ... at the instigation of Maximinus, in the tw... ty-ninth year of his age, together with his mother, A D 235

There have been likewise several popes and several kings of Scotland named Alexander, as well as a minor poet, or two but we should not hold ourselves justified in filling our pages with accounts of them.

ALEXANDERS, in botany See SMYRNIUM

ALEXANDRETTA is the port of Aleppo, from which it is distant twenty-eight or thirty leagues It is now little else but a heap of ruined houses, chiefly inhabited by Greeks, who keep tippling-houses for sailors The air is very unwholesome, and therefore the better sort of inhabitants, during the hot weather, live at a village called Bayland, on a mountain about ten miles off, where there is wholesome water and excellent fruit What surprises strangers most, when they arrive at this place are the pigeons that carry letters to Aleppo which they reach in about three hours the pigeons are of a singular kind, and are very much celebrated throughout the east Lat 36 34 N Lon 36 20 E

ALEXANDRIA, a famous city and emporium of Egypt, built by Alexander the Great years before Christ It was taken from the Christians by Amrou Ebn el As, general of the calif, in the middle of the sixth century after a siege of fourteen months, in which he lost 23,000 men It then contained four thousand baths, twelve thousand venders of vegetables, four thousand Jews who paid tribute, &c but what is still more to be regretted in its loss, the library, in which successive kings had collected more than six hundred thousand manuscripts, all of which were ordered to be destroyed by this ignorant Arabian In its modern state, it is the emporium of a very considerable commerce, the harbour for all the commodities of Egypt, by the Mediterranean except the rice of Damietta The Europeans have establishments there, where factors dispose of the merchandise by barter Vessels are constantly to be met with from Marseilles Leghorn, Venice, Ragusa, and the dominion of the grand signior, but it is not safe to winter there The town is supplied by means of a canal from Faoua, which brings the water of the Nile to reservoirs in the time of its inundation, to serve the year It is this canal which makes Alexandria a part of Egypt for from its situation without the Delta it really belongs to Lybia The Turks call it Scanderia, or Escanderia eleven leagues SW Rosetta thirty two NNW Cairo Lat 31 11 N Lon 30 16 E

ALEXANDRIA is also the name of a considerable town in the duchy of Milan, in Italy Lat 44 45 N Lon 8 43 E

ALEXANDRIA is likewise the name of a town in Virginia, on the south bank of the river Potomac Lat 38 30 N Lon 77 W About 9 miles distant from this town is Mount Vernon, the seat of the late general Washington.

ALEXANDRIA, (anc geog) a city of Arachosia, called also Alexandropolis, on the river Arachotus (Stephanus, Isidorus Characenus) — Another Alexandria in Gedrosia, built by Leonatus, by order of Alexander (Pliny) —A third Alexandria in Aria, situated at the lake Arias (Ptolemy), but, according to Pliny, built by Alexander on the river Arius —A fourth in the Bactriana (Pliny) —A fifth Alexandria, an inland town of Carmania (Pliny Ptolemy, Ammian) —A sixth Alexandria, or Alexandropolis, in the Sogdiana (Isidorus Characenus) —A seventh in India, at the confluence of the Acesines and Indus (Arrian) —An eighth, called also Alexandretta, near the Sinus Issicus, on the confines of Cilicia and Syria, now Scanderoon, the port town to Aleppo —A ninth Alexandria of Margiana, which being demolished by the barbarians, was rebuilt by Antiochus the son of Seleucus, and called Antiochia of Syria (Pliny), watered by the river Margus, which is divided into several channels, for the purposes of watering the country, which was called Zotale The city was seventy stadia in circuit, according to Pliny, who adds, that, after the defeat of Crassus, the captives were conveyed to this place by Oroses, the king of the Parthians —A tenth, of the Oxiana, built on the Oxus by Alexander, on the confines of Bactria (Pliny) —An eleventh, built by Alexander at the foot of mount Paropamisus, which was called Caucasus (Pliny, Arrian) —A twelfth Alexandria in Troas, called also Troas and Antigonia (Pliny) —A thirteenth, on the Iaxartes, the boundary of Alexander's victories towards Scythia, and the last that he built on that side

ALEXANDRIAN, in a general sense, is applied to all those who professed or taught the sciences in the school of Alexandria Alexandrian is more particularly understood of a college of priests, consecrated to the service of Alexander Severus after his deification

ALEXANDRIAN LIBRARY This famous library was founded by Ptolemy Soter, for the use of an academy he instituted in Alexandria, and, by continual additions by his successors, became at last the finest library in the world, containing no fewer than 700,000 volumes The method followed in collecting books for this library was to seize all those which were brought into Egypt by Greeks or other foreigners The books were transcribed in the museum by persons appointed for that purpose, the copies were then delivered to the proprietors, and the originals laid up in the library

In consequence of the establishment and gradual augmentation of this library, the sciences long flourished in the school of Alexandria when a little before the middle of the 7th century (A D ...), a tremendous storm arose, which threatened their total destruction in those climes Filled with all the wild enthusiasm a militant religion inspired, the successors of Mohammed ravaged that vast extent of country which stretches from the east to the southern confines of Europe All the cultivators of the arts and sciences, who from every nation had assembled in Alexandria, were driven away with ignominy Some fell beneath the swords of the conquerors others fled into remote countries to drag out the remainder

of their lives in want. The places and the instruments which had served for making an immense number of astronomical observations, were involved in one common destruction. And finally, this valuable depository of human knowledge, the Alexandrian library, which had already suffered by fire under Julius Cæsar, was entirely delivered to the flames by the Arabs. John Philoponus, surnamed the Grammarian, a famous peripatetic philosopher, being at Alexandria when the city was taken by the Saracens, was admitted to familiar intercourse with Amrou, the Arabian general, and presumed to solicit a gift, inestimable in his opinion, though contemptible in that of the barbarians; and this was the royal library. Amrou was inclined to gratify his wish, but his rigid integrity scrupled to alienate the least object without the consent of the caliph. He accordingly wrote to Omar, whose well-known answer was dictated by the ignorance of a Mahommedan fanatic. "If these writings of the Greeks agree with the Koran, they are useless, and need not be preserved; if they differ from it, they are pernicious, and ought to be destroyed!"

ALEXANDRIAN MANUSCRIPT, a famous copy of the Scriptures, consisting of four volumes, in a large quarto size, which contains the whole Bible in Greek, including the Old and New Testament, with the Apocrypha, and some smaller pieces, but not quite complete. This manuscript is now preserved in the British Museum. It was sent as a present to king Charles I. from Cyrillus Lucaris, patriarch of Constantinople, by sir Thomas Rowe, ambassador from England to the grand signior, about the year 1628. Cyrillus brought it with him from Alexandria, where probably it was written. In a schedule annexed to it, he gives this account; that it was written, as tradition informed them, by Thecla, a noble Egyptian lady, about thirteen hundred years ago, not long after the council of Nice. But this high antiquity, and the authority of the tradition to which the patriarch refers, have been disputed, nor are the most accurate biblical writers agreed about its age. Grabe thinks that it might have been written before the end of the fourth century, others are of opinion, that it was not written till near the end of the fifth century, or somewhat later. Those who are desirous of farther information concerning it, may consult the Prolegomena of Mill, Wetstein, and Grabe, or Marsh's Michaelis, vol ii, p. 186, 209, 648, 690.

ALEXANDRIAN, or ALEXANDRINE, in poetry, a kind of verse consisting of twelve, or of twelve and thirteen syllables alternately, so called from a poem on the life of Alexander, written in this kind of verse by some French poet. It is little used, except by the French, whose tragedies are generally composed of Alexandrines.

... are well characterised by Pope

... at the last and only couplet fraught
With some unmeaning thing they call a thought,
A needless Alexandrine ends the song,
That, like a wounded snake, drags its slow length along.
Essay on Criticism.

ALEXICACUM, (ἀλεξίκακον, from ἀλέξω, *to drive away*, and κακον, *evil*) An antidote, or amulet to resist poison.

ALEXICACUS, in antiquity, was an attribute of Neptune, whom the tunny-fishers used to invoke under this appellation, that their nets might be preserved from the ξιφιας, or sword-fish, which used to tear them.

ALEXIPHARMACA, ALEXIPHARMICS (ἀλεξιφαρμακα, from ἀλέξω, *to drive away*, and φαρμακον, *poison*) Febrifuges. Medicines which expel or prevent the ill effects of poisons or any malignant infection.

ALEXIPYRETICA, ALEXIPYRETICS (ἀλεξιπυρετικα, from ἀλέξω, *to expel*, and πυρετος, *a fever*) Febrifuges.

ALEXITERIA (ἀλεξιτηρια, from ἀλέξω, *to expel*, and τηρεω, *to preserve*) Expulsive restoratives, or preservatives to health.

ALFECCA, or ALPHETA, in astronomy, the same as Lucida coronæ.

ALFET, anciently signified a caldron, in which boiling water was put, for the accused to plunge in his arm up to the elbow, by way of trial or purgation.

ALFORD, a town in Lincolnshire, with a market on Tuesdays. Lat 53 16 N. Lon 0 13 E.

ALFRAGAN, a celebrated Arabic astronomer, flourished about the year 800. He wrote the Elements of Astronomy in thirty chapters or sections, chiefly following the system of Ptolemy. There are three Latin translations of this work, the best of which is by Golius of Leyden.

ALFRED THE GREAT, the youngest son of Ethelwulf, was born at Wantage, A.D. 849. He succeeded his brother Ethelred, though that prince left several children. He was crowned in 871, when the Danes were in the very heart of his dominions, and the seaports filled with their fleets. After several battles, with various success, Alfred was obliged to dismiss even his attendants; and having committed his wife and children to the care of some trusty subjects, disguised himself, and lived concealed in the little island of Athelney in Somersetshire. At length, the Danes, finding they had no enemies to oppose them, grew negligent. This incited Alfred's friends to repair to their prince, who resolving to gain an accurate knowledge of their state, boldly entered the Danish camp in the disguise of a musician, and was admitted to play before their chiefs; then returning to his friends, his troops were secretly assembled, and he soon surprised and defeated the Danes. Alfred behaved with great liberality on this occasion, giving up the kingdom of the East Angles to those of the Danes who embraced the Christian religion. Having now some respite, he employed himself in putting his kingdom into a state of defence, and in increasing his navy; and having recovered London from the Danes, he soon brought it into a flourishing state. After

some years' rest, a numerous fleet of Danes entered the Thames, and landed an immense body of troops in Kent. Those who were settled in Northumberland broke their treaty, and fitting out two fleets sailed round the coast, and committed great ravages. Alfred, however, pursued and defeated them, and made example of some of the pirates, by causing them to be executed at Winchester. At length he secured the peace of his dominions, and struck terror into his enemies, after fifty-six battles by land and sea, in all of which he was personally engaged. But what presents him most to our view, as an object of admiration, is his character as a reformer of laws and manners, and the promoter of learning. He composed a body of statutes, instituted the trial by jury, and divided the kingdom into shires and tithings. He was so exact in his government, that robbery was a crime unheard of, and valuable goods might be left on the high road, without danger of being meddled with. He also formed a parliament, which met in London twice a year. Learning, in his time was at so low an ebb that he himself complained, that from the Thames to the Humber, hardly a man could be found who understood Latin. To remedy this evil, he invited over learned men from all parts, and endowed schools in various parts of the kingdom, and if he were not the founder of the university of Oxford, certain it is, that he raised it to a style of reputation which it never enjoyed before. He was himself a learned prince, and composed several works. He divided the twenty four hours into three equal parts, one devoted to the service of God, another to public affairs, and the third to refreshment. To Alfred also we are indebted for the first formation of a naval establishment, and for being the first who sent out ships to make the discovery of a north east passage. In private life he was benevolent, pious, cheerful, and affable, and his person was amiable, dignified, and engaging. He died in 901, aged fifty-three. By his queen Elswitha, Alfred had three sons and three daughters. He was succeeded by Edward his second son, commonly called Edward the Elder.

"Fortune alone," says Hume, "by throwing Alfred into that barbarous age deprived him of historians worthy to transmit his fame to posterity, and we wish to see him delineated in more lively colours, and with more particular strokes, that we may at least perceive some of those small specks and blemishes from which, as a man, it is impossible he could be entirely exempted."

This prince, we are told, was twelve years of age before a master could be procured in the western kingdom to teach him the alphabet, such was the state of learning when Alfred began to reign. He had felt the misery of ignorance; and determined even to rival his contemporary Charlemagne in the encouragement of literature. He is supposed to have appointed persons to read lectures at Oxford, and may thence be considered as a founder of that university. By other proper establishments, and by a general encouragement to men of abilities, he did every thing in his power to diffuse knowledge throughout his dominions. Nor was this end promoted more by his countenance and encouragement, than by his own example and his writings. For notwithstanding the lateness of his initiation, he had acquired extraordinary erudition; and, had he not been illustrious as a king, he would have been famous as an author. His works are, 1. Breviarium quoddam collectum ex Legibus Trojanorum, lib. 1. A Breviary collected out of the Laws of the Trojans, Greeks, Britons, Saxons, and Danes, in one book. Leland saw this book in the Saxon tongue at Christ-church in Hampshire.—2. Visi-Saxonum Leges, lib. 1. The Laws of the West-Saxons, in one book. Pitts tells us, that it is in Bennet college library, at Cambridge.—3. Instituta quaedam, lib. 1. Certain Institutes, in one book. This is mentioned by Pitts, and seems to be the second capitulation with Guthrun.—4. Contra Judices iniquos, lib. 1. An Invective against unjust Judges, in one book.—5. Acta Magistratuum suorum, lib. 1. Acts of his Magistrates, in one book. This is supposed to be the book of judgments mentioned by Horne, and was, in all probability, a kind of reports, intended for the use of succeeding ages.—6. Regum Fortunae variae, lib. 1. The various Fortunes of Kings, in one book.—7. Dicta Sapientum, lib. 1. The Sayings of Wise Men, in one book.—8. Parabolae et Sales, lib. 1. Parables and pleasant Sayings, in one book.—9. Collectiones Chronicorum. Collections of Chronicles.—10. Epistolae ad Wulfsigium Episcopum, lib. 1. Epistles to Bishop Wulfsig, in one book.—11. Manuale Meditationum. A Manual of Meditations.—Besides these original works, he translated many authors from the Latin, &c. into the Saxon language, viz. 1. Bede's History of England. 2. Paulinus Orosius's History of the Pagans. 3. St. Gregory's Pastoral, &c. The first of these, with his prefaces to the others, together with his laws, were printed at Cambridge, 1644. His laws are likewise inserted in Spelman's Councils.—4. Boetius de Consolatione, lib. v. Boetius's Consolations of Philosophy, in five books. Dr. Plott tells us, king Alfred translated it at Woodstock, as he found in a MS. in the Cotton library.—5. Æsopi Fabulae. Æsop's Fables, which he is said to have translated from the Greek into Latin and Saxon.—6. Psalterium Davidicum, lib. 1. David's Psalter, in one book. This was the last work the king attempted, death surprising him before he had finished it; it was however completed by another hand, and published at London in 1640, in quarto, by sir John Spelman. Several others are mentioned by Malmsbury, and the old History of Ely asserts that he translated the Old and New Testaments.

ALGÆ. Flags. The second of the seven families, and the eighth of the nine tribes or nations into which Linnéus divides all vegetables. Comprehending such as have the root, leaves, and stem all in one: as the lichens or

liverworts, fuci or sea-weeds, &c (See FAMILIES and NATIONS, or GENTES) In Linnæus's artificial system, the algæ occupy one of the orders of the class cryptogamia In his Fragments of a Natural Arrangement, at the end of Genera Plantarum, they make the fifty-seventh section, and in Philosophia Botanica the sixty-sixth See BOTANY

ALGALA (from *hollow*, Arab) A hollow silver probe or catheter

ALGALI, is used, by some of the old chemical writers, to signify nitre

ALGAROTH (Powder of), was first applied as an internal medicine, by Algorotti an Italian physician It is a white oxyd of antimony, procured by adding pure water to the butter [oxymuriate] of antimony, by which the metallic oxyd is precipitated this is then edulcorated by washing, and well dried It is not now in the pharmacopœia of the London college, but is retained in that of Edinburgh

ALGAROTTI (Francis), a polite writer, was the son of a merchant at Venice, where he was born in 1712 He received a liberal education, and then went abroad to different countries He was at Paris in 1733, where he composed his Newtonianism for the Ladies After making a pretty long stay in France, he came over to England, and then visited Germany At Berlin he gained the friendship of Frederic the Great, who made him chevalier of the order of Merit, created him a count, and appointed him his chamberlain The count died at Pisa, in 1764 His works were published in Italian, at Leghorn, 1765, in four vols 8vo and afterwards translated into French, in eight vols 8vo In them the author appears to advantage as a connoisseur and a man of lively genius, but he was deficient in judgment and profound thinking

ALGAZEL, in zoology See ANTELOPE

ALGEBRA, a general method of performing calculations, relative to all sorts of quantities, by means of indeterminate characters, or symbols

Numbers and things were originally expressed by their names at full length afterwards these were abridged, and the initials of the words used instead of them, and, as the art advanced, the letters of the alphabet came to be employed as general representations of all sorts of quantities, known quantities being denoted by the first letters of the alphabet, *a*, *b*, *c*, &c and unknown ones by the last letters *x*, *y*, *z*, &c Other marks were gradually introduced, to express all kinds of operations and combinations, and the art soon became distinguished by different appellations as *l'Arte Magiore*, the Greater Art, *Regula de la Cosa*, or the Rule of the Thing, *Regula Rei & Census*, the Rule of the Thing and the Product, *Specious Arithmetic*; *Lateral Arithmetic*; *Universal Arithmetic*, &c

This is one of the most important and useful branches of the mathematical sciences and may, in many respects, be considered as the key to the rest Geometry delights us by the simplicity of its principles, and the elegance of its demonstrations Arithmetic, though of great utility, confines our attention to determinate quantities, [illegible] us by the slowness of its progress: it [illegible] for finding certain results; but the [illegible] themselves furnish no rules. Whereas Algebra is general and comprehensive, and may be applied with success in all cases where truth is to be obtained, and proper data can be established. Its great excellence is, that it deals in *generals*: it investigates and determines general solutions, general rules, general theorems, and general methods Moreover, it has this peculiar property, that it not only investigates rules in all other parts of Mathematics, but by the most admirable art and dexterity, it discovers its own rules, models them according to any form, and varies them at pleasure, so as best to answer the ends proposed

Algebra properly consists of two parts; first, the method of calculating magnitudes or quantities, as represented by letters, or other characters and 2dly, the manner of applying these calculations in the solution of problems

In Algebra, as applied to the resolution of problems, the first business is to translate the problem out of the common into the algebraic language, by expressing all the conditions and quantities, both known and unknown, by their proper characters, arranged in an equation, or several equations if necessary, and treating the unknown quantity, whether it be number, or line, or any other thing, in the same way as if it were a known one this forms the composition Then the resolution, or analytic part, is the disentangling the unknown quantity from the several others with which it is connected, so as to retain it alone on one side of the equation, while all the other, or known, quantities, are collected on the other side, and so giving the value of the unknown one And as this disentangling of the quantity sought is performed by the converse of the operations by which it is connected with the others, taking them always backwards in the contrary order, it hence becomes a species of the analytic art, and is called the modern analysis, in contradistinction to the ancient analysis, which chiefly respected geometry, and its applications

It would be attended with little or no advantage, were we to enter into an enumeration of the various fanciful etymologies of the name Algebra We shall content ourselves with the mention of those which are most to be relied upon The word Algebra, then, it is pretty certain, is Arabian Lucas de Burgo testifies, that we had both the name and the art from the Arabians, and that the Arabic name was *Algbebra e Almucabala*, which signifies the art of *restitution and comparison*, or *opposition and comparison*, or *resolution and equation*, all which agrees well enough with the nature of this art Others derive it from the word *Geber*, which with the particle *al* (the) makes *Algeber*, and is purely Arabic, signifying the reduction of fractions to integers Lucas de Burgo's account is, however, more probable

To trace this science to its origin, and to point out the various alterations and improvements it has undergone in its progress, in a manner adequate to the curiosity and importance of the particulars, would occupy a volume. Yet, as an abridged outline of these matters may be found both useful and interesting, it is here presented to the reader

As to the analytic art, of which Algebra is a species, it is doubtless as old as any science in the world, being the natural method by which the mind investigates truths, causes, and theories, from their observed effects and properties. Accordingly, traces of it are observable in the works of the earliest philosophers and mathematicians, the subjects of whose enquiries most of any require the

aid of such an art. And this process constituted their analytics. Of that part of analytics, which is properly called Algebra, the oldest treatise which has come down to us is that of Diophantus of Alexandria, who flourished about the year 350 after Christ, and who wrote, in the Greek language, thirteen books of Algebra or Arithmetic, as mentioned by himself at the end of his address to one Dionysius, though only six of them have hitherto been printed, and an imperfect book on multangular numbers, namely in a Latin translation only, by Xilander, in the year 1575 and afterwards in 1621 and 1670 in Greek and Latin by Gaspar Bachet. These books, however, do not contain a treatise on the elementary parts of Algebra, but only collections of difficult questions relating to square and cube numbers and other curious properties of numbers, with their solutions. And Diophantus only prefaces the books by an address to Dionysius, for whose use it was probably written, in which he just mentions certain precognita, as it were to prepare him for the problems themselves. In these remarks he shews the names and generation of the powers, the square, cube, 4th, 5th, 6th &c which he calls dynamis, cubus, dynamodinamis, dynamocubus, cubocubus, according to the sum of the indices of the powers, and he marks these powers with the initials thus δ^{υ}, κ^{υ}, $\delta\delta^{\upsilon}$, $\delta\kappa^{\upsilon}$, $\kappa\kappa^{\upsilon}$, &c. the unknown quantity he calls simply ἀριθμὸς, *numerus*, the number; and in the solutions he commonly marks it by the final ς, also he denotes the monades, or indefinite unit, by μ^{o}. This work is executed in a very acute and masterly manner, manifesting the utmost address and skill in the solutions, and forcing a persuasion that the author was deeply skilled in the science of Algebra, to some of the most abstruse parts of which these questions or exercises relate. Still, as he contrives his assumptions and notations so as to reduce all his conditions to a simple equation, or at least a simple quadratic, it does not appear what his knowledge was in the resolution of compound or affected equations.

Although Diophantus was the first author on Algebra that we now know of, it was not from him, but from the Moors or Arabians that we received the knowledge of Algebra in Europe, as well as that of most other sciences. And it is matter of dispute who were the first inventors of it; some ascribing the invention to the Greeks, while others say that the Arabians had it from the Persians, and these from the Indians, as well as the arithmetical method of computing by ten characters, or digits. But whoever were the inventors and first cultivators of Algebra, it is certain that the Europeans first received the knowledge, as well as the name, from the Arabians or Moors, in consequence of the close intercourse which subsisted between them for several centuries. And it appears that the art was pretty generally known, and much cultivated, at least in Italy, if not in other parts of Europe also, long before the invention of printing, as many treatises upon the art in MS are still extant in some of the most celebrated libraries: and the authors who wrote first after the invention of printing mention several earlier writers on Algebra, from whom they learnt the art.

Algebra was first cultivated in Europe chiefly among the Italians. And the first author whose works we have in print was Lucas Paciolus, or Lucas de Burgo, a Cordelier, or Minorite Friar. He wrote several treatises on Arithmetic, Algebra, and Geometry, which were printed in the years 1470, 1476, 1481, 1487, and in 1494 his principal work, intitled *Summa de Arithmetica, Geometria, Proportioni, et Proportionalita*, which is a very masterly and complete treatise on those sciences, as they then stood. He ascribes the invention of Algebra to the Arabians, and denominates the series of powers, with their marks or abbreviations, as n^{o} or *numero*, the absolute or known number; *co* or *cosa* the thing or 1st power of the unknown quantity; *ce* or *censo*, the product or square; *cu* or *cubo*, the cube, or 3d power; *ce ce* or *censo de censo*, the square squared or 4th power; p^{o} *r* or *primo relato* or 5th power; *ce cu* or *censo de cubo*, the square of the cube, or 6th power, and so on; compounding the names or indices according to the multiplication of the numbers 2, 3, &c and not according to their sum or addition, as used by Diophantus. He describes also the other characters made use of in this part, which are for the most part no more than the initials or other abbreviations of the words themselves; as ℞ for *radix*, the root, ℞ ℞ *radix de radice*, the root of the root, ℞ u *radix universale*, or *radix legata*, or *radice unita*; ℞ *cu* *radix cuba*, and $\overline{q}^{a}$ *quantita*, quantity; *p* for *piu* or plus, and *m* for *meno* or minus; and he remarks that the necessity and use of these two last characters are for connecting, by addition or subtraction, different powers together, as 3 *co* p 4 *ce* m 5 *cu* p 2 *ce ce* m 6 n^{o} that is, 3 *cose* piu 4 *censi* meno 5 *cubi* piu 2 *censi-censi* meno 6 *numeri*, or, as we now write the same thing, $3x + 4x^2 - 5x^3 + 2x^4 - 6$. From this book we learn what was the state of Algebra in Europe about the year 1500. It appears that the knowledge of the Europeans extended only to quadratic equations, of which they used only the positive roots; that they used only one unknown quantity; that they had no marks or signs for either quantities or operations, excepting only some few abbreviations of the words or names themselves; and that the art was only employed in resolving certain numeral problems. So that either the Africans had not carried Algebra beyond quadratic equations, or the Europeans had not learned the whole of the art, as it was then known to the former. And indeed it is highly probable that this latter was the case.

After the publication of the books of Lucas de Burgo the science of Algebra became more generally known and improved, especially by many persons in Italy; and about this time, or soon after, namely about the year 1505, the first rule was there found out by Scipio Ferreus, for resolving one case of a compound cubic equation. But this science, as well as other branches of Mathematics, was most of all cultivated and improved there by Hieronymus Cardan of Bononia, a very learned man, whose arithmetical writings were the next that appeared in print, namely, in the year 1539, in nine books, in the Latin language, at Milan, where he practised physic, and read public lectures on Mathematics; and in the year 1545 came out a tenth book, containing the whole doctrine of cubic equations, which had been in part revealed to him by Nicholas Tartalea, about the time of the publication of his first nine books.

The chief improvements made by Cardan, as collected from his writings, are stated below.

1st, Tartalea having only communicated to him the rules for resolving these three cases of cubic equations, viz

$\left.\begin{array}{l} x^3+bx=c, \\ x^3=bx+c, \\ x^3+c=bx, \end{array}\right\}$ he from thence raised a very large and complete work, laying down rules for all forms and varieties of cubic equation, having all their terms or wanting any of them, and having all possible varieties of signs, demonstrating all these rules geometrically, and treating very fully of almost all sorts of transformations of equations, in a manner heretofore unknown.

2d, It appears that he was well acquainted with all the roots of equations that are real, both positive and negative, or as he calls them, true and fictitious, and that he made use of them both occasionally. He also shewed that the even roots of positive quantities, are either positive or negative, that the odd roots of negative quantities, are real and negative, but that the even roots of them are impossible, or nothing a to common use.

3d, He was also acquainted with the number and nature of the roots of an equation, and that partly from the signs of the terms, and partly from the magnitude and relation of the coefficients. He knew

4th, That the number of positive roots is equal to the number of changes of the signs of the terms.

5th, That the coefficient of the second term of the equation, is the difference between the positive and negative roots.

6th, That when the second term is wanting, the sum of the negative roots is equal to the sum of the positive roots.

7th, How to compose equations that shall have given roots.

8th, That, changing the signs of the even terms, changes the signs of all the roots.

9th, That the number of roots failed in pairs, or what we now call impossible roots were alway in pairs.

10th, To change the equation from one form to another, by taking away any term out of it.

11th, To increase or diminish the roots by a given quantity. It appears also,

12th, That he had a rule for extracting the cube root of such binomials as admit of extraction.

13th, That he often used the literal notation, *a*, *b*, *c*, *d* &c.

14th, That he gave a rule for biquadratic equation, suiting all their cases, and that, in the investigation of that rule, he made use of an assumed indeterminate quantity, and afterwards found its value by the arbitrary assumption of a relation between the terms.

15th, That he applied Algebra to the resolution of geometrical problems. And

16th, That he was well acquainted with the difficulty of what is called the irreducible case, viz. $x^3=bx+c$, upon which he spent a great deal of time, in attempting to overcome it. And though he did not fully succeed in this case, any more than other persons have done since, he nevertheless made many ingenious observations about it, laying down rules for many particular forms of it, and shewing how to approximate very nearly to the root in all cases whatsoever.

Nicholas Tartalea, or Tartaglia, of Brescia, was contemporary with Cardan, and was probably older than he was, but we do not know of any book of Algebra published by him till the year 1546, the year after the date of Cardan's work on cubic equations, when he printed his *Quesiti et Inventioni diverse*, at Venice, where he resided as a lecturer on mathematics. Tartalea made no change in the notation or forms of expression used by Lucas de Burgo, calling the first power of the unknown quantity, in his language, *cosa*, the second power *censo*, the third *cubo*, &c. and writing the names of all the operations in words at length, without using any contractions, except the initial ℞ for root or radicality. So that the only things remarkable in this collection, are the discovery of the rules for cubic equations, and the curious circumstances attending the same, particularly the correspondence and conferences which took place between him and Cardan. In the course of these Tartalea was overcome by the most solemn protestations and promises of secrecy that could be made, to communicate his rules for cubics to Cardan, who, notwithstanding his plighted faith, published these rules in a work of which we have just spoken, and thus stimulated Tartalea to write on the subject, chiefly with a view to the exposure of this very censurable conduct.

About the time that Cardan and Tartalea flourished in Italy, the science of Algebra was cultivated in Germany by Stifelius and Scheubelius. Stifelius's *Arithmetica Integra* was published at Noremberg in 1544, being the year before Cardan's work on cubic equations, it is an excellent treatise both on Arithmetic and Algebra. From an examination of this work of Stifelius, it appears that the improvements made by himself, or other Germans, beyond those of the Italians, as contained in Cardan's book of 1539 were as follow.

1st He introduced the characters +, −, √, for plus, minus, and root or *radix*, as he calls it.

2d The initials ♃, ʒ, ß, &c for the powers.

3d He treated all the higher orders of quadratics by the same general rule.

4th He introduced the numeral exponents of the powers, −3, −2, −1, 0, 1, 2, 3 &c. both positive and negative, so far as integral numbers, but not fractional ones, calling them by the name *exponens*, exponent and he taught the general use of the exponents, in the several operations of powers, as we now use them, or the logarithm.

5th, And lastly, he used the general literal notation A, B, C, D &c for so many different unknown or general quantities.

John Scheubelius wrote much about the time of Cardan and Stifelius but as he takes no notice of cubic equations, it is likely that he had neither seen nor heard any thing about them. He treats pretty largely upon surds, and gives a general rule for extracting the root of any binomial or residual $a \pm b$, where one or both parts are surds, and a the greater quantity, namely, that the square root of it is $\sqrt{\frac{a+\sqrt{a^2-b^2}}{2}} \pm \sqrt{\frac{a-\sqrt{a^2-b^2}}{2}}$, which he illustrates by many examples.

A few years after the appearance of these treatises in Italy and Germany, Robert Recorde, a celebrated mathematician and physician, born in Wales, proved by his writings that Algebra was not altogether unknown in England.

The first part of his Arithmetic was published in 1552, and the second part in 1557, under the title of, "The Whetstone of Witte, which is the seconde parte of Arithmetike containing the Extraction of Rootes. The Cossike Practise, with the Rule of Equation and the Workes of Surde Nombers." The particulars which are new in the works of this author, are

1 The extraction of the roots of compound algebraic quantities.

2 The use of the terms binomial and residual.

3. The use of the sign of equality, or =.

The first edition of Peletarius's algebra was printed in 4to at Paris, in 1558, under this title, *Jacobi Peletarii Cenomani, de occulta parte Numerorum, quam Algebram vocant, Libri duo.* This is a very ingenious and masterly composition, treating in an able manner upon the several parts of the subject then known, except cubic equations His real discoveries or improvements are these

1st That the root of an equation is one of the divisors of the absolute term

2d. He taught how to reduce trinomials to simple terms, by multiplying them by compound factors

3d He taught curious precepts and properties concerning square and cube numbers, and the method of constructing a series of each by addition only, namely, by adding successively their several orders of differences

Peter Ramus wrote his arithmetic and algebra about the year 1560 His notation of the powers is thus, *l*, *q*, *c*, *bq*, being the initials of latus, quadratus, cubus, biquadratus. He treats only of simple and quadratic equations

Raphael Bombelli's algebra was published, at Bologna, in the year 1579, in the Italian language the dedication, however, is dated 1572 In this work we meet with little improvement or alteration, except in the notation, where he uses ◡ for the unknown quantity, with the numeral indices of Stifelius

The arithmetic of Simon Stevin of Bruges, was published in 1585, and his algebra a short time afterwards A general air of originality runs through the whole of this latter work of Stevenus, yet his more peculiar and remarkable inventions may be reduced to these

1st He invented a new character for the unknown quantity namely, a small circle ○ *within* which he placed the numeral exponent of the power he also greatly improved the designation of powers, by such numeral exponents, first given by Stifelius as to integral exponents but extended by Stevinus to fractional and all other sorts, thereby denoting all sorts of roots the same way as powers, by numeral exponents A circumstance hitherto thought to be of much later invention

2d He improved and extended the use and notation of coefficients, including in them fractions and radicals and all sorts of numbers in general

3d A quantity of several terms he called generally a multinomial, and he denoted all nomials whatever by particular names expressing the number of their terms, binomial, trinomial, quadrinomial, &c.

4th A numeral resolution of all equations whatever by one general method

Besides which, he hints at some unknown author as the first inventor of the rules for cubic equations, by whom may probably be intended the author of the Arabic manuscript treatise on cubic equations, given to the library at Leyden by the celebrated Warner

Most of Vieta's algebraical works were written about the year 1600, or a little before, but some of them were not published till after his death, which happened in the year 1603 And his whole mathematical works were collected together by Francis Schooten, and elegantly printed in a folio volume in 1646 Of these the algebraical parts are as follow

1 Isagoge in Artem Analyticam

2 Ad Logisticen Speciosam Notæ priores.

3 Zeteticorum libri quinque

4. De Æquationum Recognitione, & Emendatione

5 De Numerosâ Potestatum ad Exegesin Resolutione

The real inventions of this very ingenious author, are stated in the following particulars

1st He introduced the general use of the letters of the alphabet, to denote indefinite given quantities, which had only been done in some particular cases before his time But the general use of letters for the *unknown* quantities was before pretty common with Stifelius and his successors. Vieta uses the vowels A, E, I, O, U, Y, for the unknown quantities, and the consonants B, C, D, &c for known ones

2d He invented, and introduced many expressions or terms, several of which are in use to this day such as coefficient, affirmative and negative, pure and adfected, or affected unciæ, homogeneum adfectionis, homogeneum comparationis, the line or vinculum over compound quantities, thus $\overline{A+B}$. His method of setting down his equations, is to place the homogeneum comparationis, or absolute known term, on the right-hand side alone, and on the other side all the terms which contain the unknown quantity, with their proper signs

3d In most of the rules and reductions for cubic and other equations, he made some improvements, and variations in the modes

4th He shewed how to change the root of an equation in a given proportion.

5 He derived or raised the cubic and biquadratic, &c equations, from quadratics, not by composition in Harriot's way, but by squaring and otherwise multiplying certain parts of the quadratic And as some quadratic equations have two roots, therefore the cubics and others raised from them, have also the same two roots, and no more Hence he comes to know what relation these two roots bear to the coefficients of the two lowest terms of cubic and other equations, when they have only three terms, namely, by comparing them with similar equations so raised from quadratics and, on the contrary, what the roots are, in terms of such coefficients

6 He made some observations on the limits of the two roots of certain equations

7 He stated the general relation between the roots of certain equations and the coefficients of their terms, when the terms are alternately plus and minus, and none of them are wanting, or the roots all positive

8 He extracted the roots of affected equations by a method of approximation similar to that for pure powers.

9 He gave the construction of certain equations, and exhibited their roots by means of angular sections, before adverted to by Bombelli.

Albert Girard, an ingenious Flemish mathematician, died about the year 1633 The work which entitles him to notice in this history, is his "*Invention Nouvelle en l'Algebre, tant pour la solution des equations, que pour recognoistre le nombre des solutions qu'elles reçoivent, avec plusieurs choses qui sont necessaires à la perfection de ceste divine science*," which was printed at Amsterdam 1629, in small quarto, in 63 pages, viz. 49 pages on Arithmetic and Algebra, and the rest on the measure of the superficies of spherical triangles and polygons, by him then lately discovered From this work of Girard's we learn,

1st. That he was the first person who understood the general doctrine of the formation of the coefficients of the powers, from the sums of their roots, and their products, &c

2d. He was the first who understood the use of negative roots in the solution of geometrical problems.

3d He was the first who spoke of the imaginary roots, and understood that every equation might have as many roots real and imaginary and no more, as there are units in the index of the highest power And he was the first who gave the whimsical name of *quantities less than nothing* to the negative And,

4th. He was the first who discovered the rules for summing the powers of the roots of any equation

The celebrated Thomas Harriot flourished about the year 1610, near which time it is probable he wrote his algebra His inventions and improvements were important, though they may be comprehended in three particulars

1st He introduced the uniform use of the small letters a, b, c, d, &c viz the vowels a, e, &c for unknown quantities, and the consonants b, c, d, f &c for the known ones, which he joins together like the letters of a word, to represent the multiplication or product of any number of these literal quantities, and prefixing the numeral coefficient as we do at present, except only separated by a point, thus 5*bbc* For a root he set the index of the root after the mark $\surd$, as $\surd 3$ for the cube root He also introduced the characters $>$ and $<$ for greater and less and in the reduction of equations he arranged the operations in separate steps or lines, setting the explanations in the margin on the left hand, for each line By which, and other means, he may be considered as the introducer of the modern state of algebra, which quite changed its form under his hands

2d He shewed the universal generation of all the compound or affected equations by the continual multiplication of so many simple ones, or binomial roots, thereby plainly exhibiting to the eye the whole circumstances of the nature, mystery and number of the roots of equations, with the composition and relations of the coefficients of the terms, and from which many of the most important properties have since been deduced

3d He greatly improved the numeral exegesis or extraction of the roots of all equations, by clear and explicit rules and methods drawn from the foregoing generation or composition of affected equations of all degrees

Oughtred's Clavis was first published in 1631, the same year in which Harriot's algebra was published by his friend Warner Oughtred chiefly follows Vieta, in the notation by the capitals, the designation of products, powers, &c though with a few variations.

1st He was the first, as far as we can learn, who set down the decimals without their denominator he separated them thus, 21|56

2d In algebraic multiplication, he either joins the letters, which represent the factors, together like a word, or connects them by the mark $\times$, which is the first introduction of this character

3d He seems to be the first who used points to denote proportions thus 7.9 :: 28.36; and for continued proportion he has this mark ∸

4th. He denoted roots by the common radical $\surd$, for square root, *c*, for cube, *qq*, for thus $\surd q6$ $\surd c20$, $\surd qq24$, &c
quations he gives express and general for the several sorts of reductions. He letter *u* after $\surd$, for universal, instead of ... um of Vieta He observes, that all the powers of A+E are positive, but those of A−E have terms alternately positive and negative. And

6th. In this work we meet with the first instance of applying algebra to geometry, so as to investigate new geometrical properties

In 1634 Herigone published, at Paris, the first course of mathematics, in five vols 8vo, in the second of which is contained a good treatise on algebra, in which he uses the notation by small letters, introduced by the algebra of Harriot, which was published three years before, though the rest of it does not resemble that work, and one would suspect that Herigone had not seen it The whole of this piece bears evident marks of originality and ingenuity Besides + for *plus*, he uses ∽ for *minus*, and | for *equality*, with several other useful abbreviations and marks of his own In the notation of powers he does not repeat the letters like Harriot, but subjoins the numeral exponents, to the letter, as Descartes did three years afterwards And Herigone uses the same numeral exponents for roots, as $\surd 3$ for the cube root

Descartes's geometry was first published in 1637, being six years after the appearance of Harriot's algebra This work of Descartes's was rather an application of algebra to geometry, than either algebra or geometry separately considered Still he made improvements in both and with respect to the science of algebra, we may speak both of his improvements and his inventions And

1st Of his improvements That he might fit equations the better for their application in the construction of problems, Descartes mentions, as it were by the-bye, many things concerning the nature and reduction of equations, without troubling himself about the first inventors of them stating them in his own terms and manner, which is commonly more clear and explicit, and often with improvements of his own And under this head we find that he chiefly followed Cardan, Vieta, and Harriot, but especially the last, and explains some of their rules and discoveries more distinctly, and varies but a little in the notation, putting the first letters of the alphabet for the known, and the latter letters for the unknown quantities, also a^3 for *aaa*, &c, and ∞ for = But Herigone used the numeral exponents in the same manner three years before Descartes explained or improved most parts of the reductions of equations, in their various transmutations, the number and nature of their roots true and false, real and what he calls imaginary, called involved by Girard, and the depression of equations to lower degrees

2d As to his inventions and discoveries in algebra, they may be comprehended in these particulars, namely, the application of algebra to the geometry of curve lines, the constructing equations of the higher orders, and a rule for resolving biquadratic equations by means of a cubic and two quadratics

In 1644 Renaldine published in 4to, *Opus Algebraicum*, both ancient and modern, with mathematical resolution and composition And in 1665, in folio, the same, greatly enlarged, or rather a new work, which is very heavy and tedious In this work Renaldine uses the parentheses (a^2+b^2) as a vinculum, instead of the line over, as $\overline{a^2+b^2}$.

Indeed after the publication of the geometry of Descartes, a great many other ingenious men followed the same course, applying themselves to algebra and the new geometry, to the mutual improvement of them both, which was done chiefly

by reasoning on the nature and forms of equations, as generated and composed by Harriot. However, it is proper to take notice here of Fermat, a learned and ingenious mathematician, who was contemporary and a competitor of Descartes for his brightest discoveries, which he was in possession of before the geometry of Descartes appeared. Namely, the application of algebra to curve lines, which he expressed by an algebraical equation, and by them constructing equations of the 3d and 4th orders; also a method of tangents, and a method de maximis et minimis, which approach very near to the method of fluxions or increments, which they strikingly resemble both in the manner of treating the problems, and in the algebraic notation and process.

Hudde, who was a burgomaster of Amsterdam, discovered a very beautiful theorem relative to equations which contain equal roots. He shewed that, if we multiply the terms of such an equation by those of an arithmetical progression, the sum of the products is equal to *zero*, and that it forms a new equation which contains, with the exception of one, roots equal to those of the equation proposed. On this property he founded a very simple rule to discover the greatest or the least augmentation to which a variable quantity could arrive.

About this time the minds of all mathematicians were directed towards the improvement and extension of algebra. Thus, in 1655, Wallis published his *Arithmetica Infinitorum*, being a new method of reasoning on quantities, or a great improvement on the indivisibles of Cavalerius, and which in great measure led the way to infinite series, the universal application of the binomial theorem, and the method of fluxions, the two latter of which were both soon after discovered by Newton. In this work Wallis treats ingeniously (though in the estimation of many rather loosely) on quadratures, &c. and gives the first expression for the quadrature of the circle by an infinite series. It was Wallis likewise who substituted the fractional exponents in the place of radical signs, by which the operations are in many cases much facilitated and abridged. Huygens, Barrow, and other mathematicians, resolved by the algebraical calculus, many problems which the ancients could never attack with success.

In 1707 was published by Mr Whiston, the first edition of Sir Isaac Newton's *Arithmetica Universalis sive de compositione et resolutione arithmetica liber*; and many editions have been published since. This work was the text book used by our great author in his lectures, while he was professor of mathematics in the university of Cambridge. And although it was never intended for publication, it contains many and great improvements in analytics, particularly in the nature and transmutation of equations, the limits of the roots of equations; the number of impossible roots, the invention of divisors, both surd and rational, the resolution of problems, arithmetical and geometrical; the linear construction of equations, approximating to the roots of all equations, &c. To the later editions of the book is commonly subjoined, Dr. Halley's method of finding the roots of equations. As the principal parts of this work are not adapted to the circumstances of beginners, there have been published commentaries upon it by several persons, as s'Gravesande, Castillon, Wilder, &c. Many of Newton's algebraical discoveries were farther developed and explained by Halley, Maclaurin, Nicole, Stirling, Euler, Clairaut, &c.

The exponential formulæ for the sines and cosines of arcs, were first given by Demoivre, and greatly contributed to the extension of the analytical part of trigonometry, by abridging its operations and shortening the labour of investigation. A considerable improvement too, in this branch of the subject, or in what is usually called the arithmetic of sines, was introduced, we believe, by Euler, who instead of using separate letters to represent the different trigonometrical lines belonging to the same arc, *a* for instance, gives the abbreviations sin *a*, cos *a*, tan *a*, cot *a*, sec *a*, cosec *a*, &c. a method which considerably relieves the memory, and saves the trouble of repeated reference to the original notation.

The theory of series comprehends many branches, all of which have been cultivated with success during the last two centuries. James Bernoulli, Taylor, Nicole, Stirling, Maclaurin, Euler, Lambert, Landen, and Waring, are the most distinguished in these researches. Recurring series were presented for the first time by Demoivre, on occasion of considering the doctrine of *chances*, a fertile branch of the modern analysis. But it was in the hands of Daniel Bernoulli, of Euler, and of P. Riccati, that with the simple succour of the ordinary algebra, the theory of this kind of series was augmented and generalized.

The general resolution of equations of all degrees has drawn much attention down to the present time. But though the celebrated mathematicians who have been employed about this problem, as Bezout, Lacroix, Lagrange, Waring, &c. have made new observations on the nature of equations and on the form of their roots, they have not completely resolved the fifth degree, nor any of superior orders: but the nature of this article will not permit of our minutely describing their labours, and the benefits which the science has derived from them.

Having thus gone through a regular review of the various authors, whose performances have gradually contributed to reduce the science of algebra from its rude and pristine state, to its modern and more polished form, we shall conclude our history by enumerating the names of those authors, whose works it will be most adviseable for the student to consult. These are, Schooten, M. de Baune, Slusius, Brancker, Wallis, Newton, Kersey, Leibnitz, Bulliald, Baker, Rolle, De Lagny, Ward, De Moivre, Sault, Ozanam, Harris, B. Taylor, Ronayne, Stirling, Maclaurin, s'Gravesande, Simpson, Saunderson, De la Caille, Emerson, Clairaut, Dodson, Landen, Euler, Maseres, Bonnycastle, Lorgna, Wood, Frend, Manning, Lacroix, Lagrange, and Waring, the latter of whom has made many improvements and discoveries, in series, and other higher parts of algebra.

This historic sketch of the inventions and discoveries in this branch of science will, we trust, be found not only entertaining, but of great utility. In the composition of it we have been much assisted by freely availing ourselves of the very comprehensive, elaborate, and instructive history of ALGEBRA, given under that article in Dr. *Hutton's Mathematical and Philosophical Dictionary*, an article, to which, on account of its sterling value and importance, we with pleasure and confidence refer the curious reader for further information. We now proceed to a concise sys-

tematic view of the principal definitions, rules, and operations, in this department of science; as below:

DEFINITIONS

ALGEBRA is the science which reduces to computation magnitudes in general, as arithmetic is devoted to the calculation of numbers in particular.

ALGEBRA, *numeral*, is that which is chiefly concerned in the solution of numeral problems, and in which all the given quantities are expressed by numbers.

ALGEBRA, *specious or literal*, is that commonly used by the moderns, in which all quantities whether known or unknown, are expressed by general characters as letters, &c. in consequence of which general designation, all the conclusions become universal theorems for performing every operation of a similar nature with that for which the investigation was instituted.

Every figure or arithmetical character has a determinate and individual value, as, for example, the figure 4 always represents one and the same number, namely, the collection of four units. Algebraical characters, on the contrary, must be general, independent of any particular signification, and proper to represent all sorts of quantities, according to the nature of the questions to which they are applied. Further, they must be simple, and easy to describe, so as not to be troublesome in operation, or fatiguing to the memory. These advantages meet in the letters of the alphabet, which are, therefore, usually adopted to represent magnitudes in algebra.

In algebraical enquiries some quantities are assumed as known or given, and others are unknown and to be found out: the former are commonly represented by the leading letters of the alphabet a, b, c, d, &c., the latter by the final letters, w, x, y, z. Though it often tends to relieve the memory, if the initial letter of the subject under consideration be made use of, whether that be known or unknown: thus r may denote a radius, b a base, p a perpendicular, s a side, d density, m mass, &c.

The characters used to denote the operations are principally these

$+$ signifies addition, and is named *plus*

$-$ signifies subtraction, and is named *minus*

$\times$ denotes multiplication, and is named *into*

$\div$ denotes division, and is named *by*

$\surd$, the mark of radicality denotes the square root, with a 3 before it, thus $\sqrt[3]{\ }$, the cube root with a 4, thus $\sqrt[4]{\ }$, the fourth or biquadrate root, thus $\sqrt[n]{\ }$, the nth root.

[illegible]ion is commonly denoted by a colon be[illegible] antecedent and consequent of each [illegible] double colon between the two ratios [illegible] be to b as c to d, we state it as follows, $a : b :: c : d$

$=$ is the symbol of equality.

Hence $a+b$, denotes the sum of the quantities represented by a and b.

$a-b$ denotes their difference when b is the less. $b-a$ their difference when a is the less. $a \backsim b$ the difference when it is not known which is the greater. $a \times b$, or $a \cdot b$, or ab represents the product of a multiplied into b.

$a \div b$, or $\frac{a}{b}$, shews that the number represented by a is to be divided by that which is represented by b.

$\frac{b}{a}$ is the reciprocal of $\frac{a}{b}$, and $\frac{1}{a}$ the reciprocal of a.

$a : b :: c : d$ denotes that a is in the same proportion to b, as c is to d.

$x = a - b + c$ is an equation, shewing that x is equal to the difference of a and b, added to the quantity c.

$\sqrt{a}$, or $a^{\frac{1}{2}}$, is the square root of a. $\sqrt[3]{a}$, or $a^{\frac{1}{3}}$, is the cube root of a; and $\sqrt[m]{a}$, or $a^{\frac{1}{m}}$, is the mth root of a.

a^2 is the square of a; a^3 the cube of a; a^4 the fourth power of a; and a^m the mth power of a.

$\overline{a+b} \times c$, or $(a+b)\,c$, is the product of the compound quantity $a+b$ multiplied by the simple quantity c. Using the bar $\overline{\quad}$, or the parenthesis ( ) as a vinculum, to connect several quantities into one.

$\overline{a+b} \div \overline{a-b}$, or $\frac{a+b}{a-b}$, expressed like a fraction, is the quotient of $a+b$ divided by $a-b$.

$5a$ denotes that the quantity a is to be taken 5 times, and $7\,(b+c)$ is 7 times $b+c$. And these numbers, 5 or 7, shewing how often the quantities are to be taken, or multiplied, are called coefficients.

Like quantities, are those which consist of the same letters, and powers. As a and $3a$, or $2ab$ and $4ab$, or $3a^2bc$ and $-5a^2bc$.

Unlike quantities, are those which consist of different letters, or different powers. As a and b, or $2a$ and a^2, or $3ab^2$ and $5abc$.

Simple quantities, or monomials, are those which consist of one term only. As $3a$, or $5ab$, or $6abc^2$.

Compound quantities, are those which consist of two or more terms. As $a+b$, or $a+2b-3c$.

And when the compound quantity consists of two terms, it is called a binomial; when of three terms, it is a trinomial; when of four terms, a quadrinomial; more than four terms, a multinomial, or polynomial.

Positive or affirmative quantities, are those which are to be added, or have the sign $+$. As a or $+a$, or ab: for when a quantity is found without a sign, it is understood to be positive, or to have the sign $+$ prefixed.

Negative quantities, are those which are to be subtracted. As $-a$, or $-2ab$, or $-3ab^2$.

Like signs, are either all positive ($+$), or all negative ($-$).

Unlike signs, are when some are positive ($+$), and others negative ($-$).

In every quantity we may consider two things, its value, and its manner of existing with regard to other magnitudes which enter with it into the same calculation. The *value* of a quantity is expressed by the letter or by the character destined to represent the number of its units. But as to the *mode of existence* some with regard to others, magnitudes may affect the calculation either in the same or in opposite senses; which renders it necessary to distinguish two sorts of quantities, *positive* and *negative*. Thus whether a man have 1000 pounds in property or stock, or be 1000 pounds in debt, may be represented by characters, either arithmetical or algebraical, but since an actual property is directly opposite in its nature to a debt, the two must be marked by different symbols: so that, if property be reckoned a *positive* quantity and marked $+$, a debt owed must be reckoned as *negative*, and marked $-$. Again, if, [illegible] the same point, motion towards

the east be considered as a positive quantity in an investigation, motion towards the west, which is opposite to the former, must enter the same calculation as a negative quantity. If the elevations of the sun above the horizon are considered as positive quantities, the depressions of the sun below the horizon must be treated as negative quantities. It is the same with all quantities which when considered together, exist differently with respect to one another.

A residual quantity, is a binomial having one of the terms negative. As $a-2b$.

The power of a quantity (a) is its square (a^2), or cube (a^3), or biquadrate (a^4), &c., called also the 2d power, or 3d power, or 4th power, &c.

The index or exponent, is the number which denotes the power or root of a quantity. So 2 is the exponent of the square or 2d power a^2, and 3 is the index of the cube or 3d power; and $\frac{1}{2}$ is the index of the square root $a^{\frac{1}{2}}$ or $\sqrt{a}$; and $\frac{1}{3}$ is the index of the cube root $a^{\frac{1}{3}}$ or $\sqrt[3]{a}$.

A rational quantity, is that which has no radical sign ($\sqrt{}$) or index annexed to it. As a, or $3ab$.

An irrational quantity, or surd, is that which has not an exact root, or is expressed by means of the radical sign $\sqrt{}$. As $\sqrt{2}$, or $\sqrt{a}$, or $\sqrt[3]{a^2}$, or $a^{\frac{1}{2}}$.

The reciprocal of any quantity, is that quantity inverted, or unity divided by it. So, the reciprocal of a, or $\frac{a}{1}$ is $\frac{1}{a}$; and the reciprocal of $\frac{a}{b}$ is $\frac{b}{a}$.

SECT. I. *Fundamental Operations.*

The fundamental operations in algebra are performed by *Addition*, *Subtraction*, *Multiplication*, and *Division*.

PROB. I. *To add Quantities.*

Simple quantities, or the terms of compound quantities, to be added together, may be *like with like signs*, *like with unlike signs*, or they may be *unlike*.

Case 1. To add terms that are like and have like signs.

Rule. Add together the coefficients, to their sum prefix the common sign, and subjoin the common letter or letters.

Example.	To $5ab$	$3aa-ab$
	Add $4ab$	$7aa-2ab$
		$4aa-5ab$
	Sum $9ab$	$14aa-8ab$

Case 2. To add terms that are like, but have unlike signs.

Rule. Subtract the less coefficient from the greater, prefix the sign of the greater to the remainder, and subjoin the common letter or letters.

Example.	$-4a$	$+7bc$	$-5ab$
	$+7a$	$-3bc$	$+2ab$
		$+bc$	$+3ab$
	$+3a$	$+5bc$	0

Case 3. To add terms that are unlike.

Rule. Set them all down, one after another, with their signs and coefficients prefixed.

$$2a+3b-5\ \ +8$$

Compound quantities are added together, by uniting the several terms of which they consist by the preceding rules.

Example. The sum of $\begin{cases} 5ab-3xy-12cd \\ 7xy-ab+15 \\ 9cd-4xy-4mn \end{cases}$

is $4ab-3cd+15-4mn$.

Note. In this rule the word *addition* is very improperly used, being too scanty to express the operation here performed. The business of this operation is to incorporate into one mass, or algebraic expression, different algebraic quantities, as far as an actual incorporation or union is possible, and to retain the algebraic marks for doing it, in cases where the former is not possible. When we have several quantities, some affirmative and some negative, and the relation of these quantities can in the whole or in part be discovered, such incorporation of two or more quantities into one, is plainly effected by the foregoing rules.

It may seem a paradox that what is called addition in algebra, should sometimes mean addition, and sometimes subtraction. But the paradox wholly arises from the scantiness of the name given to the algebraic process, from employing an old term in a new and more enlarged sense. Instead of addition, call it incorporation, or union, or striking a balance, or any name to which a more extensive idea may be annexed than that which is usually implied by the word addition, and the paradox vanishes.

PROB. II. *To subtract Quantities.*

General Rule. Change the signs of the quantity to be subtracted into the contrary signs, and then add it, so changed, to the quantity from which it was to be subtracted; the sum arising by this addition is the remainder.

Example.	From	$+5a$	$7ab-16bc$
	Subtract	$+3a$	$3ab+mb$
	Rem.	$+2a$	$4ab-16bc-mb$

When a positive quantity is to be subtracted, the rule is obvious. In order to shew it, when the negative part of a quantity is to be subtracted, let $c-d$ be subtracted from a, the remainder, according to the rule, is $a-c+d$. For if c is subtracted from a, the remainder is $a-c$; but this is too small, because c is subtracted instead of $c-d$, which is less than it by d; the remainder, therefore, is too small by d; and d being added, it is $a-c+d$ according to the rule.

PROB. III. *To multiply Quantities.*

General Rule for the Signs. When the signs of the two terms to be multiplied are like, the sign of the product is $+$, but when the signs are unlike, the sign of the product is $-$.

Case 1. To multiply two terms.

Rule. Find the sign of the product by the general rule, after it place the product of the numeral coefficients, and set down the letters one after another.

Mult.	$+a$	$+5b$	$-5ar$
By	$+b$	-3	$-7ab$
	$+ab$	$-15b$	$+35aabr$

The reason of this rule is derived from Def. 5 and from the nature of multiplication, which is a repeated addition of one of the quantities to be multiplied as often as there are units in the other. Hence also the letters in two terms multiplied together may be placed in any order, and therefore the order of the alphabet is generally preferred.

Case 2. To multiply compound quantities.

Rule. Multiply every term of the multiplicand by all the terms of the multiplier, one after another, according to the preceding rule, and then

collect all the products into one sum, that sum is the product required

Example Mult $2a + 3b$ $\qquad m + x$

By $3ax - 4by$ $\qquad m - x$

$6a^2x + 9abx$ $\qquad m^2 + mx$

$\quad - 8aby - 12b^2y$ $\qquad - mx - x^2$

Prod $6a^2x + 9abx - 8aby - 12b^2y$ $\qquad m^2 - x^2$

Mult $a - b$

By $c - d$

$ac - cb$

$\quad - ad + db$

Prod $ac - cb - ad + db$

On the general Rule for the Signs Multiplication is the finding a magnitude which has to the multiplicand, the proportion of the multiplier to unity Hence, the multiplier must be an abstract number, and, if a simple term, can have neither + nor − prefixed to its notation Now, 1st $+a \times +m = +ma$ for the *quality* of a cannot be altered by increasing or diminishing its value in any proportion, therefore the product is of the quality *plus*, and ma by the definition is the product of a and m 2dly, $-a \times +m = -ma$, for the same reasons as before, *mutatis mutandis* 3dly, $+a \times -m$, has no meaning, for m must be an abstract number, therefore here we can have no proof But $+a \times (m - n) = ma - na$ n being less than m for a taken as often as there are units in m, is $= ma$, by the first case but a was to have been taken only as often as there are units in $m - n$, therefore a has been taken too often by the units in n consequently a taken n times, or na, must be subtracted, and of course $ma - na$ is the true product 4thly, $-a \times (m - n) = -ma + na$ For, $-a \times m = -ma$ (by case 2), but this, as above, is too great by $-na$ therefore $-ma$ with $-na$ subtracted from it, is the true product but this by the rule of subtraction, is $= -ma + na$

PROB IV *To divide Quantities*

Division is the converse of multiplication, and denotes, 1st, The finding a magnitude which has to the dividend the proportion of the divisor (an abstract number) to unity 2dly, The finding what abstract number has to unity the proportion of the dividend to an homogeneous magnitude, the divisor The cases under which this rule is generally considered are the following

Case 1 When the divisor and dividend are both simple quantities Set the terms both down as in division of numbers, either the divisor before the dividend, or below it, like the denominator of a fraction Then abbreviate these terms as much as can be done, by cancelling or striking out all the letters that are common to both of them, and also dividing the one coefficient by the other, or abbreviating them after the manner of a fraction, by dividing them by their common measure

Note Like signs in the two factors make + in the quotient; and unlike signs make −, the same as in multiplication.

Examples 1. To divide $8ab$ by $2a$

Here $8ab \div 2a$, or $2a)\,8ab$, or $\frac{8ab}{2a} = 4b$

2 Also $a \div a = \frac{a}{a} = 1$, and $abc \div bcd = \frac{abc}{bcd} = \frac{a}{d}$

Case 2. When the dividend is a compound quantity and the divisor a simple one

Divide every term of the dividend by the divisor.

1 $(10ab + 15ax) \div 5a = \frac{10ab + 15ax}{5a} = 2b + 3x$

2 $(30az - 48z) \div z = \frac{30az - 48z}{z} = 30a - 48$

3 $(10a^2x - 15x^2 - 5x) \div 5x = 2a^2 - 3x - 1$

Case 3 When the divisor and dividend are both compound quantities

1 Set them down as in common division of numbers, the divisor before the dividend, with a small crooked line between them, and ranging the terms according to the powers of some one of the letters in both, the higher powers of it before the lower

2 Divide the first term of the dividend by the first term of the divisor, as in the first case, and place the result in the quotient

3 Multiply the whole divisor by the term thus found, and subtract the result from the dividend.

4 To this remainder bring down as many terms of the dividend as are requisite for the next operation, dividing as before, and so on to the end, as in common arithmetic

Note If the divisor be not exactly contained in the dividend, the quantity which remains after the operation is finished may be placed over the divisor, like a vulgar fraction, and set down at the end of the quotient, as in common arithmetic

$x - 3)\ x^3 - 9x^2 + 27x - 27\ (x^2 - 6x + 9$

$x^3 - 3x^2$

$-6x^2 + 27x$

$-6x^2 + 18x$

$9x - 27$

$9x - 27$

$a - x)\ a^3 - x^3\ (a^2 + ax + x^2$

$a^3 - a^2x$

$a^2x - x^3$

$a^2x - ax^2$

$ax^2 - x^3$

$ax^2 - x^3$

Another Example

$a + x)\ aa + xx\ (a - x + \frac{2xx}{a} - \frac{2x^3}{a^2} + \frac{2x^4}{a^3} - \&c$

$aa + ax$

$-ax + xx$

$-ax - xx$

$+ 2xx$

$+ 2xx + \frac{2x^3}{a}$

$- \frac{2x^3}{a}$

$- \frac{2x^3}{a} - \frac{2x^4}{a^2}$

$+ \frac{2x^4}{a^2}$, &c

In this last example the signs are alternately + and −, the coefficient is constantly 2 after the first two terms, and the letters are the successive powers of x and a, so that the quotient may be

continued as far as you please without any more division

Divide $10a^3+11a^2b-19abc-15a^2c+3ab^2+15bc^2-5b^2c$ by $3ab+5a^2-5bc$ Here we arrange the dividend and divisor with regard to the letter a, setting those terms of the dividend which contain like powers of a under one another then, on multiplying by each term of the quotient we put down the respective terms of each product with their signs changed, and add, as follows

$$
\begin{array}{ll}
\text{Divisor, } \underline{5a^2+3ab-5bc} & \text{Quotient} \\
\text{Dividend} \left\{ \begin{array}{l} 10a^3+11a^2b-19abc+ \\ 15bc^2-5b^2c-15a^2c+3ab^2 \end{array} \right. & (2a+b-3c \\
\quad \underline{-10a^3-6a^2b+10abc} & \\
\text{1st Rem} \left\{ \begin{array}{l} 5a^2b-9abc+15bc^2-5b^2c \\ -15a^2c+3ab^2 \end{array} \right. & \\
\quad \underline{-5a^2b-3ab^2+5b^2c} & \\
\text{2d Rem} \left\{ \begin{array}{l} -15a^2c-9abc+15bc^2 \\ \underline{+15a^2c+9abc-15bc^2} \end{array} \right. & \\
\qquad 0 &
\end{array}
$$

Sect II *Algebraic Fractions*

Algebraic fractions have the same names and rules of operations as vulgar fractions in common arithmetic

Prob I *To reduce a mixed Quantity to an improper Fraction*

Rule Multiply the integer by the denominator of the fraction, and to the product add the numerator, then the denominator being placed under this sum, will give the improper fraction required

1 Reduce $3\frac{5}{7}$, and $a-\frac{b}{c}$ to improper fractions

First, $3\frac{5}{7}=\frac{3\times7+5}{7}=\frac{21+5}{7}=\frac{26}{7}$ Ans

And, $a-\frac{b}{c}=\frac{a\times c-b}{c}=\frac{ac-b}{c}$ Ans

2 Reduce $x+\frac{x^2}{a}$ and $x-\frac{a^2-x^2}{x}$ to improper fractions.

First, $x+\frac{x^2}{a}=\frac{x\times a+x^2}{a}=\frac{ax+x^2}{a}$ the Ans

And, $x-\frac{a^2-x^2}{x}=\frac{x^2-a^2+x^2}{x}=\frac{2x^2-a^2}{x}$ Ans

Prob II *To reduce an improper Fraction to a whole or mixed Quantity*

Rule Divide the numerator by the denominator, for the integral part, and place the remainder, if any, over the denominator, for the fractional part, the two joined together will be the mixed quantity required

1 Reduce $\frac{ax+a^2}{x}$, $\frac{ab-a^2}{b}$, to mixed quantities

Thus, $\frac{ax+a^2}{x}=\frac{ax}{x}+\frac{a^2}{x}=a+\frac{a^2}{x}$

And $\frac{ab-a^2}{b}=\frac{ab}{b}-\frac{a^2}{b}=a-\frac{a^2}{b}$

Prob III *To reduce Fractions to a common Denominator*

Rule Multiply each numerator into all the denominators except its own for a respective new numerator, and all the denominators together, for a common denominator

Reduce $\frac{a}{b}$, $\frac{c}{d}$, and $\frac{e}{f}$, to fractions having a common denominator

$$
\left.\begin{array}{l} a\times d\times f=adf \\ c\times b\times f=cbf \\ b\times d\times e=bde \end{array}\right\} \text{the numerators}
$$

$b\times d\times f=bdf$, the com denom

Therefore, $\frac{adf}{bdf}$, $\frac{cbf}{bdf}$, $\frac{bde}{bdf}$, are the fractions required

In like manner, $\frac{a}{b}$, and $\frac{a+b}{c}$, when reduced to a common denominator, become $\frac{ac}{bc}$, and $\frac{ab+b^2}{bc}$

Prob IV *To find the greatest common Measure of the Terms of a Fraction*

Rule 1 Range the quantities according to the dimensions of some letters, as is shown in division

2 Divide the greater term by the less, and the last divisor by the last remainder, and so on till nothing remains, then the divisor last used will be the common measure required

Note All the letters or figures which are common to each term of the divisors, must be thrown out of them, before they are used in the operation.

To find the greatest common measure of $\frac{x^3-b^2x}{x^2+2bx+b^2}$

$$
\begin{array}{l}
x^2+2bx+b^2)\ x^3-b^2x\ (x \\
\qquad\qquad\qquad \underline{x^3+2bx^2+b^2x} \\
\qquad\qquad\qquad -2bx^2-2b^2x)\ x^2+2bx+b^2 \\
\qquad\qquad\qquad \text{or } x+b\ )\ x^2+2bx+b^2\ (x+b \\
\qquad\qquad\qquad\qquad\qquad \underline{x^2+bx} \\
\qquad\qquad\qquad\qquad\qquad\quad bx+b^2 \\
\qquad\qquad\qquad\qquad\qquad\quad \underline{bx+b^2}
\end{array}
$$

Therefore $x+b$ is the greatest common divisor

Prob V *To reduce a Fraction to its lowest Terms*

Rule 1 Find the greatest common measure, as in the last problem

2 Divide both the terms of the fraction by the common measure thus found, and it will reduce it to its lowest terms, as was required

3 Or divide the terms both by any quantity that it may appear will divide them both

Examples

1 Reduce $\frac{cx+x^2}{ca^2+a^2x}$ to its lowest terms

$$
\begin{array}{l}
cx+x^2)\ ca^2+a^2x \\
\text{or } c+x\ )\ ca^2+a^2x\ (a^2 \\
\qquad\qquad \underline{ca^2+a^2x}
\end{array}
$$

Here $cx+x^2$ is divided by x which is common to both terms

Therefore $c+x$ is the greatest common measure, and $c+x)\ \frac{cx+x^2}{ca^2+a^2x}=\frac{x}{a^2}$ is the fraction required.

Prob VI *To add Algebraic Fractions together, or to subtract them one from another*

Rule Reduce them to a common denominator, then add or subtract the numerators; and the sum or difference set over the common denominator is the sum or remainder required

Example Add together $\frac{a}{b}$, $\frac{c}{d}$, $\frac{e}{f}$, the sum is $\frac{adf+cbf+bde}{bdf}$

From $\frac{a}{b}$ subt $\frac{c}{d}$ the difference is $\frac{ad-bc}{bd}$

4

Cor. 1. Integers and fractions may be added and subtracted by this rule, by considering unity as the denominator of the integers.

Thus, $b+\frac{c}{d}=\frac{bd+c}{d}$ and $a-\frac{a^2-b^2}{2a}=\frac{2a^2-a^2+b^2}{2a}=\frac{a^2+b^2}{2a}$.

Cor. 2. A fraction, whose numerator is a compound quantity, may be distinguished into parts by dividing the numerator into several parts, and setting each over the original denominator, and uniting the new fractions by the signs of their numerators.

Thus, $\frac{a^2-2ab+b^2}{2a}=\frac{a^2}{2a}-\frac{2ab}{2a}+\frac{b^2}{2a}=\frac{a}{2}-b+\frac{b^2}{2a}$.

Add together 1, $\frac{x}{a}$, $\frac{x^2}{a^2}$, $\frac{x^3}{a^3}$, and $\frac{x^4}{a^4-a^3x}$.

The quantities reduced to the denominator a^4-a^3x, are $\frac{a^4-a^3x}{a^4-a^3x}+\frac{a^3x-a^2x^2}{a^4-a^3x}+\frac{a^2x^2-ax^3}{a^4-a^3x}+\frac{ax^3-x^4}{a^4-a^3x}+\frac{x^4}{a^4-a^3x}$; where the numerators annihilate each other's last and first terms throughout, except the first term a^4; therefore the sum is $\frac{a^4}{a^4-a^3x}$, or in its lowest terms $\frac{a}{a-x}$.

PROB. VII. *To multiply Fractions.*

Rule. Multiply their numerators into one another for the numerator of the product, and their denominators into one another, for the denominator of the product.

Example. $\frac{a}{b}\times\frac{c}{d}=\frac{ac}{bd}$. $\frac{a+b}{c}\times\frac{a-b}{d}=\frac{a^2-b^2}{cd}$.

Proof. Let $\frac{a}{b}=m$, and $\frac{c}{d}=n$. Then $a=bm$, and $c=dn$, and $ac=bdmn$; and ($mn=$) $\frac{a}{b}\times\frac{c}{d}=\frac{ac}{bd}$.

Multiply $\frac{2x}{a}$, $\frac{3b}{c}$, and $\frac{3ac}{2b}$ together.

$\frac{2x}{a}\times\frac{3b}{c}\times\frac{3ac}{2b}=\frac{9x}{1}\times\frac{2abc}{2abc}=9x$.

PROB. VIII. *To divide Fractions.*

Rule. Multiply the numerator of the dividend by the denominator of the divisor, for a new numerator; and the denominator of the dividend by the numerator of the divisor, for a new denominator.

Thus, $\frac{a}{b})\frac{c}{d}(\frac{bc}{ad}=\frac{c}{d}\times\frac{b}{a}$.

Proof. Let $\frac{a}{b}=m$, and $\frac{c}{d}=n$, then $a=bm$, and $c=dn$, also $ad=bdm$ and $bc=bdn$; therefore $\left(\frac{bdn}{bdm}=\right)\frac{n}{m}=\frac{bc}{ad}$.

Find the quotient of $\frac{2x^2}{a^3+x^3}$ divided by $\frac{x}{x+a}$.

$\frac{2x^2}{a^3+x^3}\times\frac{x+a}{x}=\frac{2x^2\times(x+a)}{(a^3+x^3)\times x}=\frac{2x}{x^2-ax+a^2}$ is the quotient required.

Again, $\frac{x^4-b^4}{x^2-2bx+b^2}\div\frac{x^2+bx}{x-b}=\frac{x^4-b^4}{(x-b)^2}\times\frac{x-b}{x(x+b)}=\frac{x^4-b^4}{x(x+b)(x-b)}=\frac{x^4-b^4}{x(x^2-b^2)}=\frac{x^2+b^2}{x}=x+\frac{b^2}{x}$.

SECT. III. *Of the Involution of Quantities.*

The products arising from the continual multiplication of the same quantity, were before called the powers of that quantity. Thus, a, a^2, a^3, a^4, &c. are the powers of a; and ab, a^2b^2, a^3b^3, a^4b^4, &c. are the powers of ab. And the rule given for the multiplication of powers of the same quantity is to "Add the exponents, and make their sum the exponent of the product." Thus $a^4\times a^5=a^9$, and $a^2b^3\times a^3b^2=a^5b^5$. For dividing powers of the same quantity the rule is "To subtract the exponents, and make the difference the exponent of the quotient."

Thus, $\frac{a^6}{a^4}=a^{6-4}=a^2$, and $\frac{a^5b^3}{a^4b}=a^{5-4}b^{3-1}=ab^2$.

If you divide a less power by a greater, the exponent of the quotient must, by this rule, be negative. Thus, $\frac{a^4}{a^6}=a^{4-6}=a^{-2}$. But $\frac{a^4}{a^6}=\frac{1}{a^2}$; and hence $\frac{1}{a^2}$ is expressed also by a^2 with a negative exponent, or a^{-2}.

It is also obvious that $\frac{a}{a}=a^{1-1}=a^0$, but $\frac{a}{a}=1$, and therefore $a^0=1$. After the same manner, $\frac{1}{a}=\frac{a^0}{a}=a^{0-1}=a^{-1}$, $\frac{1}{aa}=\frac{a^0}{a^2}=a^{0-2}=a^{-2}$, $\frac{1}{aaa}=a^{0-3}=a^{-3}$, so that the quantities a, 1, $\frac{1}{a}$, $\frac{1}{a^2}$, $\frac{1}{a^3}$, $\frac{1}{a^4}$, &c. may be expressed thus a^1, a^0, a^{-1}, a^{-2}, a^{-3}, a^{-4}, &c. Those are called the negative powers of a, which have negative exponents, but they are at the same time positive powers of $\frac{1}{a}$, or a^{-1}.

Negative powers (as well as positive) are multiplied by adding, and divided by subtracting, their exponents. Thus the product of a^{-2} (or $\frac{1}{a^2}$) multiplied by a^{-3} (or $\frac{1}{a^3}$) is $a^{-2-3}=a^{-5}$ (or $\frac{1}{a^5}$), also $a^{-5}\times a^4=a^{-5+4}=a^{-1}$ (or $\frac{1}{a}$), and $a^{-3}\times a^3=a^0=1$. And, in general, any positive power of a multiplied by a negative power of a of an equal exponent, gives unit for the product; for the positive and negative exponents destroy each other, and the product gives a^0, which is equal to unit.

Likewise $\frac{a^{-5}}{a^{-2}}=a^{-5+2}=a^{-3}=\frac{1}{a^3}$, and $\frac{a^{-2}}{a^{-5}}=a^{-2+5}=a^3$. But also, $\frac{a^{-2}}{a^{-5}}=\frac{a^{-2}}{a^{-2}\times a^{-3}}=\frac{1}{a^{-3}}$, therefore $\frac{1}{a^{-3}}=a^3$. And, in general, "any quantity placed in the denominator of a fraction, may be transposed to the numerator, if the sign of its exponent be changed." Thus $\frac{1}{a^3}=a^{-3}$, and $\frac{1}{a^{-3}}=a^3$.

The quantity a^m expresses any power of a;

general, the exponent (m) being undetermined, and a^{-m} expresses $\frac{1}{a^m}$, or a negative power of a of an equal exponent and $a^n \times a^{-m} = a^{n-m} = a^0 = 1$ is their product a^n expresses any other power of a, $a^m \times a^n = a^{m+n}$ is the product of the powers of a^m and a^n, and a^{n-n} is their quotient

To raise any simple quantity to its second third, or fourth power, is to add its exponent twice, thrice or four times to itself, therefore the second power of any quantity is had by doubling its exponent and the third by trebling its exponent, and in general, the power expressed by m of any quantity is had by multiplying the exponent by m, as is obvious from the multiplication of powers Thus the second power or square of a is $a^{2\times 1} = a^2$ its third power or cube is $a^{3\times 1} = a^3$, and the mth power of a is $a^{m\times 1} = a^m$ Also, the square of a^4 is $a^{2\times 4} = a^8$, the cube of a^4 is $a^{3\times 4} = a^{12}$, and the mth power of a^4 is $a^{4\times m}$ The square of abc is $a^2b^2c^2$, the cube is $a^3b^3c^3$, the mth power $a^mb^mc^m$

The raising of quantities to any power is called Involution, and any simple quantity is involved by multiplying the exponent by that of the power required, as in the preceding examples

The coefficient must also be raised to the same power by a continual multiplication of itself by itself, as often as unit is contained in the exponent of the power required Thus the cube of $3ab$ is $3 \times 3 \times 3 \times a^3b^3 = 27a^3b^3$

As to the sign, when the quantity to be involved is positive it is obvious that all its powers must be positive And when the quantity to be involved is negative, yet all its powers whose exponents are even numbers must be positive for any number of multiplications of a negative, if the number is even give a positive

The power, then, only can be negative when its exponent is an odd number, though the quantity to be involved be negative The powers of $-a$ are $-a$, $+a^2$, $-a^3$, $+a^4$ $-a^5$ &c Those whose exponents are 2, 4, 6, &c are positive, but those whose exponents are 1, 3, 5, &c are negative

The involution of compound quantities is a more difficult operation The powers of any binomial $a+b$ are found by a continual multiplication of it into itself, as follows

$$\begin{array}{l}
a + b = \text{Root} \\
\times a + b \\
\hline
a^2 + ab \\
\quad + ab + b^2 \\
\hline
a^2 + 2ab + b^2 = \text{the Square, or 2d Power} \\
\times a + b \\
\hline
a^3 + 2a^2b + ab^2 \\
\quad + a^2b + 2ab^2 + b^3 \\
\hline
a^3 + 3a^2b + 3ab^2 + b^3 = \text{Cube, or 3d Power} \\
\times a + b \\
\hline
a^4 + 3a^3b + 3a^2b^2 + ab^3 \\
\quad + a^3b + 3a^2b^2 + 3ab^3 + b^4 \\
\hline
a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4 = \text{Biquadrate}
\end{array}$$

If the powers of $a-b$ are required they will be found the same as the preceding, only the terms in which the exponent of b is an odd number will be found negative, "because an odd number of multiplications of a negative produces a negative Thus, the cube of $a-b$ will be found to be $a^3 - 3a^2b + 3ab^2 - b^3$, where the 2d and 4th terms are negative, the exponent of b being an odd number in these terms In general, the terms of any power of $a-b$ are positive and negative alternately

Sir Isaac Newton's Rule for raising a Binomial or Residual Quantity to any Power whatever

1 *To find the Terms without the Coefficients* The index of the first or leading quantity, begins with that of the given power and decrease continually by 1, in every term to the last, and in the following quantity, the indices of the terms are 0, 1, 2, 3 4 &c

2 *To find the Unciæ, or Coefficients* The first is always 1, and the second is the index of the power, and in general, if the coefficient of any term be multiplied by the index of the leading quantity, and the product be divided by the number of terms to that place, it will give the coefficient of the term next following

Note The whole number of terms will be one more than the index of the given power and when both terms of the root are $+$, all the terms of the power will be $+$ but if the second term be $-$, all the odd terms will be $+$, and the even terms $-$

This rule expressed in general terms, is as follows

$$\overline{a+b}|^n = a^n + n a^{n-1} b + n \frac{n-1}{2} a^{n-2} b^2 + n \frac{n-1}{2} \frac{n-2}{3} a^{n-3} b^3, \&c$$

$$\overline{a-b}|^n = a^n - n a^{n-1} b + n \frac{n-1}{2} a^{n-2} b^2 - n \frac{n-1}{2} \frac{n-2}{3} a^{n-3} b^3, \&c$$

The sum of the coefficients, in every power, is equal to the number 2 raised to that power Thus $1+1=2$ for the first power $1+2+1=4=2^2$ for the square $1+3+3+1=8=2^3$ for the cube or third power and so on

But if the coefficients be taken *plus* and *minus* alternately, the sum of the coefficients is nothing See BINOMIAL

Let $x-a$ be involved to the 6th power The terms without the coefficients will be

$$x^6\ \ x^5a\ \ x^4a^2,\ x^3a^3,\ x^2a^4,\ xa^5,\ a^6$$

and the coefficients will be

$$1, 6, \frac{6\times 5}{2}, \frac{15\times 4}{3}, \frac{20\times 3}{4}, \frac{15\times 2}{5}, \frac{6\times 1}{6},$$

or 1, 6 15, 20 15 6, 1

And therefore the 6th power of $x-a$ is

$$x^6 - 6x^5a + 15x^4a^2 - 20x^3a^3 + 15x^2a^4 - 6xa^5 + a^6$$

If a quantity consisting of three or more terms is to be involved, "you may distinguish it into two parts considering it as a binomial, and raise it to any power by the preceding rule, and then by the same rules you may substitute instead of the powers of the compound parts their values Thus,

$\overline{a+b+c}|^2 = \overline{a+b}|^2 + 2 \times \overline{a+b} \times c + c^2 = a^2 + 2ab + b^2 + 2ac + 2bc + c^2$ And $\overline{a+b+c}|^3 = \overline{a+b}|^3 + 3c \times \overline{a+b}|^2 + 3c^2 \times \overline{a+b} + c^3 = a^3 + 3a^2b + 3ab^2 + b^3 + 3a^2c + 6abc + 3b^2c + 3ac^2 + 3bc^2 + c^3$

In these examples, $a+b+c$, is considered as composed of the compound part $a+b$ and the simple part c, and then the powers of $a+b$ are formed by the preceding rules

Of Evolution The reverse of Involution, or the resolving of powers into their roots is called Evolution The roots of single quantities are easily

extracted by dividing their exponents by the number that denominates the root required Thus, the square root of a^8 is $a^{\frac{8}{2}}=a^4$, and the square root of $a^4 b^8 c^2$ is $a^2 b^4 c$. The cube root of $a^6 b^3$ is $a^{\frac{6}{3}} b^{\frac{3}{3}}=a^2 b$, and the cube root of $x^9 y^6 z^{12}$ is $x^3 y^2 z^4$ The ground of this rule is obvious from the rule for Involution. The powers of any root are found by multiplying its exponent by the index that denominates the power, and therefore, when any power is given, the root must be found by dividing the exponent of the given power by the number that denominates the kind of root that is required

It appears from what was said of Involution, that " any power that has a positive sign may have either a positive or negative root, if the root is denominated by any even number " Thus the square root of $+ a^2$ may be $+ a$, or $- a$, because $+ a \times + a$, or $- a \times - a$ gives $+ a^2$ for the product

But if a power have a negative sign, " no root of it denominated by an even number can be assigned " since there is no quantity that multiplied into itself an even number of times can give a negative product Thus the square root of $- a^2$ cannot be assigned, and is what we call an " impossible or imaginary quantity "

But if the root to be extracted is denominated by an odd number, then shall the sign of the root be the same as the sign of the given number whose root is required Thus the cube root of $- a^3$ is $- a$, and the cube root of $- a^6 b^3$ is $-a^2 b$

If the number that denominates the root required be a divisor of the exponent of the given power, then shall the root be only a " lower power of the same quantity " As the cube root of a^{12} is a^4, the number 3 that denominates the cube root being a divisor of 12

But if the number that denominates what sort of root be required be not a divisor of the exponent of the given power, " then the root required shall have a fraction for its exponent " Thus the square root of a^3 is $a^{\frac{3}{2}}$, the cube root of a^5 is $a^{\frac{5}{3}}$, and the square root of a itself is $a^{\frac{1}{2}}$

To find the Square Root of a Compound Quantity proceed exactly as in common arithmetic Thus,

Extract the square root of $x^4-4x^3+6x^2-4x+1$

$$
\begin{array}{l}
x^4-4x^3+6x^2-4x+1\ (x^2-2x+1=\text{root} \\
x^4 \\
\hline
2x^2-2x)\ -4x^3+6x^2 \\
\qquad\qquad -4x^3+4x^2 \\
\\
2x^2-4x+1)\ 2x^2-4x+1 \\
\qquad\qquad 2x^2-4x+1
\end{array}
$$

To find the Roots of Powers in general

Rule 1 Find the root of the first term, and place it in the quotient

2 Subtract its power from that term, and bring down the second term for a dividend

3 Involve the root, last found, to the next lowest power, and multiply it by the index of the given power for a divisor

4 Divide the dividend by the divisor, and the quotient will be the next term of the root

5 Involve the whole root, and subtract and divide as before, and so on till the whole is finished.

Extract the cube root of $x^6+6x^5-40x^3+96x-64$.

$$
\begin{array}{l}
x^6+6x^5-40x^3+96x-64\ (x^2+2x-4 \\
x^6 \\
\\
3x^4)\ 6x^5 \\
\\
x^6+6x^5+12x^4+8x^3 \\
\hline
3x^4)\ -12x^4 \\
\hline
x^6+6x^5-40x^3+96x-64
\end{array}
$$

By the same rule the square root of a^2-x^2, found to be $a-\frac{x^2}{2a}-\frac{x^4}{2\cdot 4a^3}-\frac{3x^6}{2\cdot 4\cdot 6a^5}$, &c an infinite series whose law of continuation is manifest

So also the cube root of $1-x^3$, is $1-\frac{x^3}{3}-\frac{x^6}{9}-\frac{5x^9}{81}-$ &c

Powers and roots may likewise be found in infinite series, by means of an obvious modification of the binomial theorem thus

Substitute the particular letters of the binomial, with their proper signs, in the following general form, and it will give the root required, observing that P is the first term, Q the second term divided by the first, $\frac{m}{n}$ the index of the power or root and A, B, C, D, &c the foregoing terms with their proper signs

$$\overline{P+QP}^{\frac{m}{n}}=P^{\frac{m}{n}}=A+\frac{m}{n}AQ=B+\frac{m-n}{2n}BQ=C+\frac{m-2n}{3n}CQ=D+\frac{m-3n}{4n}DQ=E, \&c$$

Examples

1 To extract the root of r^2-x^2, in an infinite series

Here $P=r^2$, $Q=-\frac{x^2}{r^2}$, and $\frac{m}{n}=\frac{1}{2}$, therefore

$(r^2-x^2)^{\frac{1}{2}}=r+(\frac{1}{2}\times A\times -\frac{x^2}{r^2}) + (-\frac{1}{4}\times B\times -\frac{x^2}{r^2}) + (-\frac{3}{6}\times C\times -\frac{x^2}{r^2})+(-\frac{5}{8}\times D\times -\frac{x^2}{r^2})$, &c

$=r+(-\frac{x^2}{2r^2}A)+(\frac{x^2}{4r^2}B)+(\frac{3x^2}{6r^2}C)+(\frac{5x^2}{8r^2}D)$, &c

$=r-\frac{x^2}{2r^2}A+\frac{x^2}{4r^2}B+\frac{3x^2}{6r^2}C+\frac{5x^2}{8r^2}D$, &c

which, by restoring the values of A, B, C, D, &c becomes $r-\frac{x^2}{2r}-\frac{x^4}{8r^3}-\frac{x^6}{16r^5}-\frac{5x^8}{128r^7}$, &c the series required

2 To find the value of $\frac{1}{(a+b)^2}$, or its equal $(a+b)^{-2}$, in an infinite series

Here $P=a$, $Q=\frac{b}{a}$, and $\frac{m}{n}=-\frac{2}{1}$, therefore $(a+b)^{-2}$

$=a^{-2}+(-\frac{2}{1}A\ \frac{b}{a})+(-\frac{3}{2}B\ \frac{b}{a})+(-\frac{4}{3}C\ \frac{b}{a})+(-\frac{5}{4}D\ \frac{b}{a})$, &c

$=\frac{1}{a^2}+(-\frac{2b}{a}A)+(-\frac{3b}{2a}B)+(-\frac{4b}{3a}C)+(-\frac{5b}{4a}D)$ &c

$\frac{1}{a^2}-\frac{2b}{a}A-\frac{3b}{2a}B-\frac{4b}{3a}C-\frac{5b}{4a}D$, &c

which by restoring the values of A, B, C, D, becomes $\frac{1}{a^2} - \frac{2b}{a^3} + \frac{3b^2}{a^4} - \frac{4b^3}{a^5} + \frac{5b^4}{a^6}$, &c the series required

See SERIES

SECT IV SURDS

Surds, or irrational quantities, are such as have no exact root, but are usually denoted by means of the sign of radicality ($\sqrt{}$) placed before them

Thus $\sqrt{5}$, or $5^{\frac{1}{2}}$ is a surd, being the square root of 5

$\sqrt[3]{7}$, or $7^{\frac{1}{3}}$, cube root of 7, is a surd

$a^{\frac{2}{3}}$, or $\sqrt[3]{a^2}$ is a surd, at least, when a^2 is not a cube number

The most useful problems relating to surds, are the following

PROB I *To Reduce a Rational Quantity to the Form of a Surd*

Rule Raise the quantity to a power equivalent to that denoted by the index of the surd, then over this new quantity place the radical sign, and it will be of the form required

Thus, 1 To reduce 3 to the form of the square root

First $3 \times 3 = 3^2 = 9$, whence $\sqrt{9}$ is the answer

2 To reduce $2x^2$ to the form of the cube root

First, $2x^2 \times 2x^2 \times 2x^2 = (2x^2)^3 = 8x^6$,

whence $\sqrt[3]{8x^6}$ or $(8x^6)^{\frac{1}{3}}$ is the answer

A rational quantity may be put into the form of a surd, by reducing its index to the form of a fraction of the same value

Thus, $a = a^{\frac{2}{2}} = \sqrt{a^2}$

$a^2b = a^{\frac{6}{3}}b^{\frac{1}{3}} = \sqrt[3]{a^6b}$

PROB II *To Reduce Quantities of different Indices, to other equivalent ones, that shall have a common Index*

Rule 1 Divide the indices of the quantities by the given index, and the quotients will be the new indices for those quantities

2 Over the said quantities, with their new indices, place the given index, and they will make the equivalent quantities required

3 A common index may also be found by reducing the indices of the quantities to a common denominator, and involving each of them to the power denoted by its numerator

1 Reduce $15^{\frac{1}{4}}$ and $9^{\frac{1}{6}}$ to equivalent quantities having the common index $\frac{1}{2}$

$\frac{1}{4} \div \frac{1}{2} = \frac{1}{4} \times \frac{2}{1} = \frac{2}{4} =$ the 1st index

$\frac{1}{6} \div \frac{1}{2} = \frac{1}{6} \times \frac{2}{1} = \frac{2}{6} = \frac{1}{3}$ the 2d index

Therefore $(15^{\frac{1}{2}})^{\frac{1}{2}}$ and $(9^{\frac{1}{3}})^{\frac{1}{2}}$ are the quantities required

2 Reduce a^2 and $x^{\frac{1}{4}}$ to the same common index $\frac{1}{2}$

$\frac{2}{1} \div \frac{1}{2} = \frac{2}{1} \times \frac{2}{1} = \frac{4}{1}$ the 1st index

$\frac{1}{4} \div \frac{1}{2} = \frac{1}{4} \times \frac{2}{1} = \frac{2}{4}$ the 2d index

PROB III *To reduce Surds to their most simple Terms*

Rule 1 Divide the given surd into factors, one of which at least is a complete power, set the root of this factor before the other factor or factors, with the radical sign between them

2 When the surd is a fraction whose denominator is not a complete power, multiply both numerator and denominator by such a number as will make the denominator a complete power Then proceed as above.

1 Reduce $\sqrt[3]{108}$ to its simplest terms

$\sqrt[3]{108} = \sqrt[3]{27 \times 4} = \sqrt[3]{27} \times \sqrt[3]{4} = 3 \times \sqrt[3]{4} = 3\sqrt[3]{4}$.

2 Reduce $\sqrt{\frac{50}{147}}$ to its simplest terms

$$\sqrt{\frac{50}{147}} = \sqrt{\frac{50}{147} \times \frac{3}{3}} = \sqrt{\frac{25 \times 6}{441}} = \frac{5}{21}\sqrt{6}$$

3 Reduce $\sqrt[3]{\frac{16}{81}}$ to its simplest terms

$\sqrt[3]{\frac{16}{81}} = \sqrt[3]{\frac{16}{81} \times \frac{9}{9}} = \sqrt[3]{\frac{8 \times 18}{729}} = \frac{2}{9}\sqrt[3]{18}$

Fractions that contain either a binomial or residual surd, in the denominator, may commonly be simplified by multiplying both numerator and denominator by a number containing the same surds as the denominator, but connected by a different sign

$$\text{Thus, } \frac{\sqrt{20}+\sqrt{12}}{\sqrt{5}-\sqrt{3}} = \frac{\sqrt{20}+\sqrt{12}}{\sqrt{5}-\sqrt{3}} \times \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}+\sqrt{3}} = \frac{16+2\sqrt{60}}{5-3} = \frac{16+2\sqrt{4 \times 15}}{2} = \frac{16+4\sqrt{15}}{2} = 8+2\sqrt{15}$$

PROB IV *To add Surd Quantities together*

Rule 1 Reduce such quantities as have unlike indices to other equivalent ones, having a common index

2 Bring all fractions to a common denominator, and reduce the quantities to their simplest terms, as in the last problem

3 Then, if the surd part be the same in them all, annex it to the sum of the rational parts, with the sign of multiplication, and it will give the total sum required

But if the surd part be not the same in all the quantities, they can only be added by the signs + and

1 It is required to add $\sqrt{27}$ and $\sqrt{48}$ together

First, $\sqrt{27} = \sqrt{9 \times 3} = 3\sqrt{3}$, and $\sqrt{48} = \sqrt{16 \times 3} = 4\sqrt{3}$, whence, $3\sqrt{3} + 4\sqrt{3} = (3+4)\sqrt{3} = 7\sqrt{3} =$ sum required

2 Add together $2\sqrt[3]{a^3b}$ and $3\sqrt[3]{64bx^6}$

$2\sqrt[3]{a^3b} = 2\sqrt[3]{a^3} \times \sqrt[3]{b} = 2a\sqrt[3]{b}$

$3\sqrt[3]{64bx^6} = 3\sqrt[3]{64x^6} \times \sqrt[3]{b} = 24x^3\sqrt[3]{b}$

Therefore, $2a\sqrt[3]{b} + 24x^3\sqrt[3]{b} = (2a + 24x^3)\sqrt[3]{b}$, the sum

PROB V *To find the Difference of Surd Quantities*

Rule Prepare the quantities as in the last rule, and the difference of the rational parts annexed to the common surd, will give the difference of the surds required

But if the quantities have no common surd they can only be subtracted by means of the sign −

1 Required to find the difference of $\sqrt{448}$ and $\sqrt{112}$

First, $\sqrt{448} = \sqrt{64 \times 7} = 8\sqrt{7}$, and $\sqrt{112} = \sqrt{16 \times 7} = 4\sqrt{7}$

Whence $8\sqrt{7} - 4\sqrt{7} = 4\sqrt{7}$ the difference required

2 Find the difference of $8\sqrt[3]{a^3b}$ and $\sqrt[3]{a^6b}$

$8\sqrt[3]{a^3b} = 8a\sqrt[3]{b}$, and $\sqrt[3]{a^6b} = a^2\sqrt[3]{b}$

Therefore the difference is $(8a \backsim a^2)\sqrt[3]{b}$

PROB VI *To Multiply Surd Quantities together*

Rule Reduce the surds to the same index, next multiply the rational quantities together, and the surds together, then the one product annexed to the other will give the whole product required, which may be reduced to its most simple terms by Problem III

1 Find the product of $\frac{1}{2}\sqrt[3]{2}$ and $\frac{3}{4}\sqrt[3]{\frac{5}{6}}$

Here $\frac{1}{2} \times \frac{3}{4} \times \sqrt[3]{\frac{2}{1}} \times \sqrt[3]{\frac{5}{6}} = \frac{3}{8}\sqrt[3]{\frac{10}{18}} = \frac{3}{8}\sqrt[3]{\frac{5}{9}} = \frac{3}{8}\sqrt[3]{\frac{5}{9} \times \frac{3}{3}} = \frac{3}{8}\sqrt[3]{\frac{15}{27}} = \frac{3}{8} \times \frac{1}{3} \times \sqrt[3]{15} = \frac{1}{8}\sqrt[3]{15}$

2 The product of $\frac{2}{3}\sqrt{\frac{1}{8}}$ into $\frac{3}{7}\sqrt{\frac{7}{10}}$ is equal to

$\frac{2}{7}\sqrt{\frac{7}{80}} = \frac{2}{7}\sqrt{\frac{7}{80} \times \frac{5}{5}} = \frac{2}{7}\sqrt{\frac{35}{400}} = \frac{2}{7} \times \frac{1}{20}\sqrt{35} = \frac{1}{70}\sqrt{35}$.

3 The product of $(x+y)^{\frac{1}{2}}$ into $(x+y)^{\frac{1}{3}}$, is $(x+y)^{\frac{1}{2}+\frac{1}{3}} = (x+y)^{\frac{3}{6}+\frac{2}{6}} = (x+y)^{\frac{5}{6}}$

Prob. VII *To Divide one Surd Quantity by another*

Rule Reduce the surds to the same index, then take the quotient of the rational quantities, and annex it to the quotient of the surds, and it will give the whole quotient required, which may be reduced to its most simple terms as before

1 It is required to divide $8\sqrt{108}$ by $2\sqrt{6}$

$8 \div 2\sqrt{(108 \div 6)} = 4\sqrt{18} = 4\sqrt{(9 \times 2)} = 4 \times 3\sqrt{2} = 12\sqrt{2}$, the quotient required

2 Divide $\sqrt[3]{a^2b - bx^2}$ by $\sqrt[3]{b}$

$\sqrt[3]{a^2b - bx^2} \div \sqrt[3]{b} = \sqrt[3]{a^2 - x^2} = \sqrt[3]{a+x} \times \sqrt[3]{a-x}$

3 Divide $(x+y)^{\frac{3}{4}}$ by $(x+y)^{\frac{2}{3}}$

$(x+y)^{\frac{3}{4}} \div (x+y)^{\frac{2}{3}} = (x+y)^{\frac{3}{4}-\frac{2}{3}} = (x+y)^{\frac{9-8}{12}} = (x+y)^{\frac{1}{12}}$

Prob VIII *To Involve or raise Surd Quantities to any Power*

Rule Multiply the index of the quantity by the index of the power to which it is to be raised, and to the result annex the power of the rational parts, and it will give the power required

1 Find the cube of $\frac{5}{7}\sqrt{7}$

First, $\frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} = \frac{125}{343}$, and $(\sqrt{7})^3 = 7^{\frac{3}{2}} = (343)^{\frac{1}{2}}$

Therefore $\frac{125}{343}\sqrt{343}$ is the cube

2 Find the 4th power of $\frac{1}{6}\sqrt{6}$

Fourth power of $\frac{1}{6}$ is $\frac{1}{36 \times 36}$, and the 4th power of $\sqrt{6}$ is $6^{\frac{4}{2}} = 6^2 = 36$ Therefore $\frac{1}{36 \times 36} \times 36 = \frac{1}{36}$, is the 4th power required

3 Square $a - \sqrt{b}$

Here $(a - \sqrt{b}) \times (a - \sqrt{b}) = a^2 - 2a\sqrt{b} + b$, the square required

Prob IX *To Extract the Roots of Surd Quantities*

Rule Divide the index of the given quantity by the index of the root to be extracted, then to the result annex the root of the rational part, and it will give the root required

1 It is required to find the square root of $9\sqrt[3]{3}$

First, $\sqrt{9} = 3$, and $(3^{\frac{1}{3}})^{\frac{1}{2}} = 3^{\frac{1}{3} \div 2} = 3^{\frac{1}{6}}$, therefore $(9\sqrt[3]{3})^{\frac{1}{2}} = 3\,3^{\frac{1}{6}}$, the square root required

2 Find the nth root of $(x+y)^m$

Here $\sqrt[n]{(x+y)^m} = (x+y)^{m \div n} = (x+y)^{\frac{m}{n}}$

3 The square root of a binomial or residual surd $A + B$, or $A - B$, may be found thus Take $\sqrt{A^2 - B^2} = D$,

then $\sqrt{A + B} = \sqrt{\frac{A+D}{2}} + \sqrt{\frac{A-D}{2}}$,

and $\sqrt{A - B} = \sqrt{\frac{A+D}{2}} - \sqrt{\frac{A-D}{2}}$

Thus, the square root of $8 + 2\sqrt{7} = 1 + \sqrt{7}$

and the square root of $3 - \sqrt{8} = \sqrt{2} - 1$

But for the cube or any higher root, no general rule can be given

Sect V Simple Equations

An equation is a proposition asserting the equality of two quantities, and is expressed by placing the sign $=$ between them

A Simple Equation is that which contains only one power of the unknown quantity, without including different powers

Thus, $x - 2a + 3b = c$ is a simple equation, containing only one power of the unknown quantity x

Reduction of Equations, is the method of finding the value of the unknown quantity

It consists in ordering the equation so, that the unknown letter or quantity may stand alone on one side of the equation, or of the mark of equality, without a coefficient, and all the rest, or the known quantities, on the other side —In general, the unknown quantity is disengaged from the known ones *by performing the reverse operations* So, if they are connected with it by + or addition, they must be subtracted, if by minus (−), or subtraction, they must be added, if by multiplication we must divide by them if by division, we must multiply, also, any power of the unknown quantity is taken away by extracting the root, and any root is removed by raising it to the power As in the following rules, first given by sir Isaac Newton

1 Any quantity may be transposed from one side of the equation to the other by changing its sign And this rule is used to remove, or take away quantities from the side of the unknown one, when they are connected with it, by the sign + or −, or to remove the unknown quantity from them

Thus, if $x + 3 = 7$, then will $x = 7 - 3 = 4$

Also, if $x - a + b = c - d$, then will $x = a - b + c - d$

2 If the unknown term be multiplied by any quantity, it is to be taken away by dividing all the other terms of the equation by it

Thus if $ax - ab = a$ then will $x = b - 1$

And, if $2x + 4 = 16$, then will $x + 2 = 8$, and $x = 8 - 2 = 6$

3 If the unknown term be divided by any quantity it may be taken away, by multiplying all the other terms of the equation by it

Thus if $\frac{x}{2} = 5 + 3$, then will $x = 10 + 6 = 16$

And, if $\frac{x}{a} = b + c - d$, then will $x = ab + ac - ad$

4 The unknown quantity in any equation may be made free from surds by transposing the rest of the terms by Rule 1 and then involving each side to such a power as is denoted by the index of the surd

Thus if $\sqrt{4x + 16} - 12$, then will $4x + 16 = 144$, or $4x = 144 - 16 = 128$, and if both sides of the equation be divided by 4, x will be $= 32$

5 If that side of the equation which contains the unknown quantity be a complete power, it may be reduced, by extracting the root of the said power on both sides of the equation

Thus, if $x^2 + 6x + 9 = 25$, then will $x + 3 = \sqrt{25} = 5$, or $x = 5 - 3 = 2$

6 Any analogy or proportion may be converted into an equation by making the product of the two mean terms equal to that of the two extremes

Thus, if $3x : 16 :: 5 : 10$, then will $3x \times 10 = 16 \times 5$, or $30x = 80$, or $x = \frac{80}{30} = \frac{8}{3} = 2\frac{2}{3}$

And, if $\frac{2x}{3} : a :: b : c$, then will $\frac{2cx}{3} = ab$, and $2cx = 3ab$, or $x = \frac{3ab}{2c}$

7 If the same quantity be found on both sides of the equation, with the same sign, it may be taken away from each, and if every term in an equation be multiplied or divided by the same quantity, it may be struck out of them all

Thus, if $4x+a=b+a$; then will $4x=b$, and $x=\frac{b}{4}$

And, if $3ax+5ab=8ac$, then will $3x+5b=8c$, and $x=\frac{8c-5b}{3}$

Ex. 1 Given $5x-15=2x+6$, to find the value of x

First, $5x-2x=6+15$
Or, $3x=6+15=21$

And therefore $x=\frac{21}{3}=7$

Ex 2 Given $b+z=\sqrt{b^2+z\sqrt{a^2+z^2}}$, to find z

First, by squaring both sides of the equation, we have, $b^2+2bz+z^2=b^2+z\sqrt{a^2+z^2}$

Then by striking the b^2 from both sides, results, $2bz+z^2=z\sqrt{a^2+z^2}$

Dividing by z gives, $2b+z=\sqrt{a^2+z^2}$

Squaring both sides, $4b^2+4bz+z^2=a^2+z^2$

Striking the z^2 from both sides, and transposing $4b^2$ gives, $4bz=a^2-4b^2$

And, dividing by $4b$, $z=\frac{a^2-4b^2}{4b}=\frac{a^2}{4b}-b$

Of reducing double, triple &c Equations, containing two, three, or more unknown Quantities

PROB I *To Exterminate two unknown Quantities or, to Reduce the two Simple Equations containing them, to a Single one*

Rule I 1 Observe which of the unknown quantities is the least involved, and find its value in each of the equations, by the methods already explained

2 Let the two values, thus found be made equal to each other and there will arise a new equation with only one unknown quantity in it, whose value may be found as before

Rule II 1 Consider which of the unknown quantities you would first exterminate, and let its value be found in that equation where it is least involved

2 Substitute the value thus found for its equal in the other equation and there will arise a new equation with only one unknown quantity whose value may be found as before

Rule III 1 Let the given equations be multiplied, or divided by such numbers or quantities as will make the term which contains one of the unknown quantities the same in both equations

2 Then, by adding or subtracting the equations according as the case may require there will arise a new equation, with only one unknown quantity, as before

PROB II *To Exterminate the Unknown Quantities or, to Reduce the three Simple Equations, containing them, to a Single one*

Rule 1 Let x, y, and z, be the three unknown quantities, to be exterminated

2 Find the value of x from each of the three given equations

3 Compare the first value of x with the second, and an equation will arise involving only y and z

4 In like manner, compare the first value of x with the third, and another equation will arise involving only y and z

5 Find the values of y and z from these two equations, according to the former rules, and x, y, and z, will be exterminated as required

Note Much in the same manner may any number of unknown quantities be exterminated But there are often shorter methods for performing the operation, which will be best learnt from practice

Ex 1 Given $\left\{\begin{array}{l} x+y+z=29 \\ x+2y+3z=62 \\ \frac{1}{2}x+\frac{1}{3}y+\frac{1}{4}z=10 \end{array}\right\}$, to find x, y, and z

From the first $x=29-y-z$
From the second, $x=62-2y-3z$
From the third $x=20-\frac{2}{3}y-\frac{1}{2}z$
Whence $29-y-z=62-2y-3z$
And $29-y-z=20-\frac{2}{3}y-\frac{1}{2}z$
Also from the first of these, $y=33-2z$
And from the second, $y=27-\frac{3}{2}z$
Therefore $33-2z=27-\frac{3}{2}z$, or $z=12$
Whence also $y=33-2z=9$
And $x=29-y-z=8$

Ex 2 Given $x+y=a$, $x+z=b$, and $y+z=c$, to find x, y, z

(1) $x+y=a$
(2) $x+z=b$
(3) $y+z=c$

Their sum is (4) $2x+2y+2z=a+b+c$
Its half is (5) $x+y+z=\frac{1}{2}a+\frac{1}{2}b+\frac{1}{2}c$
From this take equa (3) and there remains $x=\frac{1}{2}a+\frac{1}{2}b-\frac{1}{2}c$
From (5) take (2), leaves $y=\frac{1}{2}a-\frac{1}{2}b+\frac{1}{2}c$
From (5) take (1) leaves $z=-\frac{1}{2}a+\frac{1}{2}b+\frac{1}{2}c$

QUEST 1 The paving of a square at 2s a yard costs as much as the inclosing it at 5s a yard required the side of the square?

Let x=side of the square sought,
Then $4x$=yards of inclosure,
And x^2=yards of pavement,
Hence $4x\times5=20x$=price of inclosing,
And $x^2\times2=2x^2$=price of paving,
But $2x^2=20x$ by the question,
Therefore $2x=20$, and $x=10$=length of the side required

2 A market woman bought in a certain number of eggs at two a penny, and as many at three a penny, and sold them all out again at the rate of five for two pence, and by so doing lost fourpence, what number of eggs had she?

Let x=number of eggs of each sort,
Then will $\frac{1}{2}x$=price of the first sort,
And $\frac{1}{3}x$=price of the second sort,
But $5:2::2x$ (the whole number of eggs) $\frac{4}{5}x$,
Whence $\frac{4}{5}x$ price of both sorts, at 5 for 2 pence,
And $\frac{1}{2}x+\frac{1}{3}x-\frac{4}{5}x=4$ by the question,
That is $x+\frac{2}{3}x-\frac{8}{5}x=8$,
Or $3x+2x-\frac{24}{5}x=24$,
Or $15x+10x-24x=120$,
Or $x=120$=number of eggs of each sort required

3 A person has two horses, and a saddle worth 50l now if the saddle be put on the back of the first horse, it will make his value double that of the second but if it be put on the back of the second, it will make his value triple that of the first, what is the value of each horse?

Let the first horse be denoted by x, and the second by y
Then $x+50=2y$
And $y+50=3x$
From the first equation, $x=2y-50$
This value substituted for x in the second, gives $y+50=3(2y-50)=6y-150$
Consequently $6y-y=50+150$,
that is $5y=200$, or $y=40$
Hence $x=2y-50=80-50=30$

SECT VI QUADRATIC EQUATIONS.

A Simple Quadratic Equation, is that which involves the square of the unknown quantity only

An affected or adfected quadratic equation, is that which involves the square of the unknown

quantity in one term, and the first power in another term.

Thus, $ax^2=b$, is a simple quadratic equation;

And $ax^2+bx=c$, is an affected quadratic equation.

The rule for a simple quadratic equation has been given already.

Rule 1. Transpose all the terms involving the unknown quantity to one side, and the known terms to the other; and so that the term containing the square of the unknown quantity may be positive.

2. If the square of the unknown quantity is multiplied by any coefficient, all the terms of the equation are to be divided by it, so that the coefficient of the square of the unknown quantity may be 1.

3. Add to both sides the square of half the coefficient of the unknown quantity, and the side of the equation involving the unknown quantity will be a complete square.

4. Extract the square root from both sides of the equation, and by transposing the abovementioned half coefficient, a value of the unknown quantity is obtained in known terms.

The reason of this rule is manifest from the composition of the square of a binomial, for it consists of the squares of the two parts, and twice the product of the two parts.

The different forms of quadratic equations, expressed in general terms, being reduced by the first and second parts of the rule, are these.

1. $x^2+ax=b^2$
2. $x^2-ax=b^2$
3. $x^2-ax=-b^2$

Case 1. $x^2+ax=b^2$

$$x^2+ax+\frac{a^2}{4}=b^2+\frac{a^2}{4}$$

$$x+\frac{a}{2}=\pm\sqrt{b^2+\frac{a^2}{4}}$$

$$x=\pm\sqrt{b^2+\frac{a^2}{4}}-\frac{a}{2}$$

Case 2. $x^2-ax=b^2$

$$x^2-ax+\frac{a^2}{4}=b^2+\frac{a^2}{4}$$

$$x-\frac{a}{2}=\pm\sqrt{b^2+\frac{a}{4}}$$

$$x=\frac{a}{2}\pm\sqrt{b^2+\frac{a^2}{4}}$$

Case 3. $x^2-ax=-b^2$

$$x^2-ax+\frac{a^2}{4}=\frac{a^2}{4}-b^2$$

$$x-\frac{a}{2}=\pm\sqrt{\frac{a^2}{4}-b^2}$$

$$x=\frac{a}{2}\pm\sqrt{\frac{a^2}{4}-b^2}$$

1. Every quadratic equation will have two roots, except such of the third form whose roots become impossible.

2. In the two first forms one of the roots must be positive, and the other negative.

3. In the third form, if $\frac{a^2}{4}$, or the square of half of the coefficient of the unknown quantity, be greater than b^2, the known quantity, the two roots will be positive. If $\frac{a^2}{4}$ be equal to b^2, the two roots become equal; but if $\frac{a^2}{4}$ is less than b^2, the quantity under the radical sign becomes negative, and the two roots are impossible.

4. If the equation express the relation of magnitudes abstractly considered, where a contrariety cannot be supposed to take place, the negative roots cannot be of use, or rather there are no such roots, for then a negative quantity by itself is unintelligible, and therefore the square root of a positive quantity must be positive only.

Ex. 1. Given $\frac{1}{2}x^2-\frac{1}{3}x+20\frac{1}{2}=42\frac{2}{3}$, to find x.

Here, $\frac{1}{2}x^2-\frac{1}{3}x=42\frac{2}{3}-20\frac{1}{2}=22\frac{1}{6}$ by transposition;

And $x^2-\frac{2}{3}x=44\frac{1}{3}$ by multiplying by 2.

Then $x^2-\frac{2}{3}x+\frac{1}{9}=44\frac{1}{3}+\frac{1}{9}=44\frac{4}{9}$ by completing the square,

Hence $x-\frac{1}{3}=\sqrt{44\frac{4}{9}}=6\frac{2}{3}$ by evolution,

Therefore $x=6\frac{2}{3}+\frac{1}{3}=7$ the answer.

2. Given $ax^2+bx=c$, to find x.

First, $x^2+\frac{b}{a}x=\frac{c}{a}$ by division,

Then $x^2+\frac{b}{a}x+\frac{b^2}{4a^2}=\frac{c}{a}+\frac{b^2}{4a^2}$ by completing the square,

And $x+\frac{b}{2a}=\sqrt{(\frac{c}{a}+\frac{b^2}{4a^2})}=\sqrt{\frac{4ac+b^2}{4a^2}}$ by evolution,

Therefore $x=\pm\sqrt{(\frac{4ac+b^2}{4x^2})}-\frac{b}{2a}$.

When the terms of a quadratic of this form $ax^2-bx=-c$, are so related that $b-c=a$, then will the two roots of the equation be unity and $\frac{c}{a}$. Thus, if $4x^2-7x=-3$, then $x=1$ or $=\frac{3}{4}$.

If $7x^2-23x=-16$, then $x=1$, or $x=\frac{16}{7}$. And so of others. The demonstration of this useful property is left for the learner's ingenuity.

In many cases the roots of quadratic equations may be more readily obtained by a table of logarithmic sines and tangents than by any other method: the precepts for this purpose are these.

1. If the relation of three assumed lines a, b, and x be such, that $ax-x^2=b^2$; then it will be, as $\frac{1}{2}a : b ::$ radius : the sine of an angle. And as radius : the tangent (or cotangent) of half that angle :: $b : x$.

2. If the relation of three lines a, b, and x, be such that $x^2\pm ax=b^2$, then it will be, as $\frac{1}{2}a : b ::$ radius : the tangent of an angle. And as radius : the tangent or cotangent of half this angle (according as the sign of ax is positive or negative) :: $b : x$.

Quest. 1. Sold a piece of cloth for 24*l.* and gained as much *per cent.* as the cloth cost me; what was the price of the cloth?

Let x = pounds the cloth cost,

Then $24-x$ = whole gain,

But $100 : x :: x : 24-x$ by the question,

Or $x^2=100\times\overline{24-x}=2400-100x$,

That is, $x^2+100x=2400$,

Then $x^2+100x+2500=4900$ by completing the square;

And $x+50=\sqrt{4900}=70$ by extraction of roots;

Consequently $x=70-50=20$*l.* = price of the cloth.

2. A person bought a number of oxen for 80*l.* and if he had bought four more for the same money, he would have paid 1*l.* less for each; how many did he buy?

Let the number of oxen be represented by x;

Then will $\frac{80}{x}$ be the price of each.

And $\frac{80}{x+4}$ = price of each, if $x+4$ had cost 80*l.*

But $\frac{80}{x}=\frac{80}{x+4}+1$ by the question,

Or $80=\frac{80x}{x+4}+x$, by multiplication,

Or $80x+320=80x+x^2+4x$, by the same,

That is, $x^2+4x=320$

Then $x^2+4x+4=324$ by completing the square,

And $x+2=\sqrt{324}=18$ by evolution,

Conseq $x=18-2=16$, the number of oxen required.

3 The sum of two numbers added to their product make 41, and the sum of the squares made less by the sum of the numbers leaves 50. What are the numbers?

Let x and y represent the numbers

Then (1) $xy+x+y=41$

And (2) $x^2+y^2-(x+y)=50$

Twice equa (1) added to equa. (2) gives $x^2+2xy+y^2+x+y=132$,

That is $(x+y)^2+(x+y)=132$.

Considering $x+y$ as *one* unknown quantity, and completing the square, we have $(x+y)^2+(x+y)+\frac14=132\frac14=\frac{529}{4}$

Extract the root, $x+y+\frac12=\frac{23}{2}$

By transposing $\frac12$, $x+y=\frac{23}{2}-\frac12=11$

Substituting this value of $x+y$ for it in equa (1) and transposing, we have $xy=41-11=30$

The last equa. but one gives $x=11-y$,

And the last gives $x=\frac{30}{y}$

Therefore, by equality, $11-y=\frac{30}{y}$

Multiplying by y, $11y-y^2=30$

Changing the signs, $y^2-11y=-30$

Compl. the square, $y^2-11y+\frac{121}{4}=\frac{121-120}{4}=\frac14$

Extracting the root, $y-\frac{11}{2}=\pm\frac12$

Transposing $\frac{11}{2}$, gives $y=\frac{11}{2}\pm\frac12=6$ or 5

Hence $x=11-y=5$ or 6

So that 5 and 6 are the numbers sought

Sect VII Equations of all Degrees

1. Of the Origin and Composition of Equations, and of the Signs and Coefficients of their Terms.

The higher orders of equations, and their general affections, are best investigated by considering their origin from the combination of inferior equations

In this general method, all the terms of any equation are brought to one side, and the equation is expressed by making them equal to 0 Therefore if a root of the equation be inserted instead of (x) the unknown quantity, the positive terms will be equal to the negative, and the whole must be equal to 0

Def When any equation is put into this form, the term in which (x) the unknown quantity is of the highest power is made the *First*, that in which the index of x is less by 1 is the second, and so on, till the last into which the unknown quantity does not enter, and which is called the *Absolute Term*

Prop I If any number of equations be multiplied together, an equation will be produced, of which the dimension is equal to the sum of the dimensions of the equations multiplied

If any number of simple equations be multiplied together, as $x-a=0$, $x-b=0$, $x-c=0$, &c the product will be an equation of a dimension, containing as many units as there are simple equations. In like manner, if higher equations are multiplied together, as a cubic and a quadratic, one of the fifth order is produced, and so on.

Conversely. An equation of any dimension is considered as compounded either of simple equations, or of other such, that the sum of their dimensions is equal to the dimension of the given one. By the resolution of equations these inferior equations are discovered, and by investigating the component simple equations, the roots of any higher equation are found

Cor 1 An equation admits of as many solutions, or has as many roots, as there are simple equations which compose it

Cor 2 And conversely no equation can have more roots than it has dimensions

Cor 3. Imaginary or impossible roots must enter an equation by pairs, for they arise from quadratics, in which both the roots are such. And an equation of an even dimension may have all its roots, or any even number of them impossible; but an equation of an odd dimension must at least have one possible root

Cor 4 The roots are either positive or negative, according as the roots of the simple equations from which they are produced, are positive or negative

Cor 5 When one root of an equation is discovered, one of the simple equations is found, from which the given one is compounded The given equation, therefore being divided by this simple equation, will give an equation of a dimension lower by 1

Prop II. To explain the general properties of the signs and coefficients of the terms of an equation

Let $x-a=0$, $x-b=0$, $x-c=0$, $x-d=0$ &c or let a, b, c, d, &c be the assumed roots of an equation to be generated then, according to the method invented by Harriot, multiply these equations together, thus

$$\begin{array}{llllll}
x-a=0 \\
x-b=0 \\
\hline
x^2-ax \\
\quad -bx+ab \\
\hline
x^2-a & & & & & \\
\quad -b & \} \; x+ab=0, & \text{the quadratic Equation,} \\
x-c\;------=0 \\
\hline
x^3-\overline{a+b}\;x^2+abx \\
\quad -c\;x^2+\overline{ac+bc}\;x-abc \\
\hline
x^3- & a\;x^2+ab & & x-abc=0, & \text{the cubic Equa.} \\
\quad - & b\quad +ac \\
\quad - & c\quad +bc \\
x- & d & & =0 \\
\hline
x^4- & a\;x^3+ab & x^2 & -abc & x+abcd=0, \text{ the biquadratic Equa} \\
\quad - & b\quad +ac & & -abd \\
\quad - & c\quad +bc & & -acd \\
\quad - & d\quad +ad & & -bcd \\
 & \quad +bd \\
 & \quad +cd
\end{array}$$

From this table it is plain,

1 That in a complete equation the number of terms is always greater by unit than the dimension of the equation

1 The coefficient of the first term is 1

The coefficient of the second term is the sum of all the roots (a, b, c, d, &c) with their signs changed.

The coefficient of the third term is the sum of all the products that can be made by multiplying any two of the roots together.

The coefficient of the fourth term is the sum of all the products which can be made by multiplying together any three of the roots with their signs changed, and so of others.

The last term is the product of all the roots, with their signs changed.

3. From induction it appears, that in any equation (the terms being regularly arranged as in the preceding example) there are as many positive roots as there are changes in the signs of the terms from + to −, and from − to +, and the remaining roots are negative. The rule also may be demonstrated.

Note. The impossible roots in this rule are supposed to be either positive or negative.

Cor. If a term of an equation is wanting the positive and negative parts of its coefficient must then be equal. If there is no absolute term, some of the roots = 0, and the equation may be depressed by dividing all the terms by the lowest power of the unknown quantity in any of them. In this case also, $x-0=0$, $x-0=0$, &c. may be considered as so many of the component simple equations, by which the given equation being divided, it will be depressed so many degrees.

It has been commonly taken for granted, from the time of Harriot down to the present, or at least inferred from very faulty reasoning, that any equation of any degree whatever is the product of as many simple factors as there are units in the exponent of its degree. This proposition has been proved conditionally by Lacroix, in the following manner.

It is evident from the rules of division alone, that the first member of the equation

$$x^n + Px^{n-1} + Qx^{n-2} + \&c. = 0$$

being divided by $x-a$, will give a quotient of the form

$$x^{n-1} + P'x^{n-2} + Q'x^{n-3} + \&c.$$

P′, Q′ &c. denoting known quantities different from P, Q, &c. we have therefore

$x^n + Px^{n-1} + \&c. = (x-a)(x^{n-1} + P'x^{n-2} + \&c.)$ so that according to the observation we shall develope under the article QUADRATICS the equation proposed is verified in two ways, namely, by making

$$x-a=0, \text{ or } x^{n-1} + P'x^{n-2} \;\&c. = 0$$

If now the equation $x^{n-1} + P'x^{n-2} + \&c. = 0$, have one root $= b$, its first member will be divisible by $x-b$, we have therefore

$x^{n-1} + P'x^{n-2}$, &c. $= (x-b)(x^{n-2} + P''x^{n-3} + \&c.)$ and consequently

$x^n + Px^{n-1} + \&c. = (x-a)(x-b)(x^{n-2} + P''x^{n-3} \&c.)$

The equation proposed may therefore be verified three ways, namely, by making

$$x-a=0,\ x-b=0, \text{ or } x^{n-2} + P''x^{n-3} + \&c. = 0$$

If the last of these equations have one root c, its first member is resolvable again into two factors

$$(x-c)(x^{n-3} + P'''x^{n-4} + \&c.) = 0$$

and we have

$$x^n + Px^{n-1} + Qx^{n-2} + \&c. =$$

$$(x-a)(x-b)(x-c)(x^{n-3} + P'''x^{n-4} + \&c.),$$

whence it appears that the equation proposed may be verified after four manners, namely, by making

$x-a=0,\ x-b=0,\ x-c=0,\ x^{n-3} + P'''x^{n-4} + \&c. = 0$

By continuing to reason thus, we shall obtain successively the factors of the degrees $n-4$, $n-5$, $n-6$, &c., and if each of these factors, being equal to zero, be susceptible of a root, the first member of the proposed equation will be reduced to the form

$$(x-a)(x-b)(x-c)(x-d) \ldots (x-l),$$

that is to say, it will be decomposed into as many factors of the first degree, as there are units in the exponent n of its dimension. The equation

$$x^n + Px^{n-1} + Qx^{n-2} + \&c. = 0$$

may therefore be verified in n different ways, namely, by making

$x-a=0$, or $x-b=0$, or $x-c=0$, or $x-d=0$, or lastly $x-l=0$,

l being supposed the last of the roots found by the process indicated above.

It must here be remarked, that these equations can only be regarded as true alternately, and that we should fall into manifest contradictions if we were to suppose that they all obtain at the same time. In effect, if $x-a=0$, we deduce $x=a$, while $x-b=0$, gives $x=b$, quantities which can never agree when a and b are unequal quantities.

The first member of the proposed equation

$$x^n + Px^{n-1} + Qx^{n-2} + \&c. = 0,$$

being decomposed into n factors of the first degree

$$x-a,\ x-b,\ x-c,\ x-d \ldots x-l$$

cannot have other factors of the same degree. In fact, if this first member were divisible by $x-\alpha$, for example we must have necessarily

$x^n + Px^{n-1} + \&c. = (x-\alpha)(x^{n-1} + px^{n-2} + \&c.)$ and consequently

$(x-a)(x-b)(x-c)(x-d) \ldots (x-l)$

$$= (x-\alpha)(x^{n-1} + px^{n-2} + \&c.);$$

but the first member of this equation vanishing when $x=a$ it ought to be the same with regard to the second, which would, in this case, become

$$(a-\alpha)(a^{n-1} + pa^{n-2} + \&c.),$$

and as a and α are supposed unequal, the first factor $a-\alpha$ is not $= 0$, it is therefore the factor

$$a^{n-1} + pa^{n-2} + \&c.$$

which must become so; hence, the quantity a is necessarily a root of the equation

$$x^{n-1} + px^{n-2} + \&c. = 0$$

And from this it follows, that its first member is divisible by $x-a$, and that

$x^{n-1} + px^{n-2} + \&c. = (x-a)(x^{n-2} + p'x^{n-3} + \&c.)$ whence it results that

$(x-a)(x-b)(x-c)(x-d) \ldots (x-l)$

$$= (x-\alpha)(x-a)(x^{n-2} + p'x^{n-3} + \&c.)$$

Dividing the two members of this equation by $x-a$, we deduce

$(x-b)(x-c)(x-d) \ldots (x-l)$

$$= (x-\alpha)(x^{n-3} + p''x^{n-4} + \&c.)$$

Proceeding thus till we have taken away successively from each member $n-1$ factors, there will only remain in the one $x-l$, and in the other $x-\alpha$: we must therefore conclude, that $x-l = x-\alpha$, or $l=\alpha$, which is contradictory to the original supposition. From all this it follows, that *an equation of any degree whatever, cannot be produced by a number of simple factors, greater than the exponent of its degree.* Lacroix, I. 206.

Other reflections on this subject may be seen in the second volume of Lacroix's algebra.

2 Transformation of Equations

Prop 1 The affirmative roots of an equation become negative, and the negative become affirmative, by changing the signs of the alternate terms beginning with the second.

Thus the roots of the equation $x^4 - x^3 - 19x^2 + 49x - 30 = 0$, are $+1$, $+2$, $+3$, -5, whereas the roots of the equation $x^4 + x^3 - 19x^2 - 49x - 30 = 0$, are -1, -2, -3, $+5$

The reason of this is derived from the composition of the coefficients of these terms which consist of combinations of odd numbers of the roots

Prop 2 An equation may be transformed into another that shall have its roots greater or less than the roots of the given equation by some given difference

Let e be the given difference, then $y = x \pm e$, and $x = y \mp e$, and if for x and its powers in the given equation, $y \mp e$ and its powers be inserted a new equation will arise, in which the unknown quantity is y, and its value will be $x \pm e$

Let the equation proposed be $x^3 - px^2 + qx - r = 0$, of which the roots must be diminished by e By inserting for x and its powers $y + e$ and its powers, the equation required is,

$$\left.\begin{array}{l} y^3 + 3ey^2 + 3e^2y + e^3 \\ -py^2 - 2pey - pe^2 \\ \quad + qy + qe \\ \quad -r \end{array}\right\} = 0$$

Cor 1 The use of this transformation is to take away the second, or any other intermediate term, for as the coefficients of all the terms of the transformed equation, except the first, involve the powers of e and known quantities only by putting the coefficient of any term equal to 0, and resolving that equation a value of e may be determined, which being substituted, will make that term to vanish

Thus let the coefficient $3e - p = 0$, and $e = \frac{1}{3}p$ which being substituted for e, the new equation will want the second term And universally the coefficient of the first term of an equation of n dimensions being 1, the second term may be taken away, by supposing $x = y \pm \frac{1}{n} p$

Cor 2 The second term may be taken away by the solution of a simple equation, the third by the solution of a quadratic and so on

Prop 3 An equation may be transformed into another of which the roots shall be equal to the roots of the given equation, multiplied or divided by a given quantity

Let $y = xe$, or $y = \frac{x}{e}$

Then substitute for x and its powers, $\frac{y}{e}$ or ye and its powers, and the new equation will have the property required

Cor 1 An equation, in which the coefficient of the first term is any known quantity, as a, may thus be transformed into another, in which the coefficient of the first term shall be unit Thus, let the equation be $ax^3 - px^2 + qx - r = 0$

Suppose $y = ax$, or $x = \frac{y}{a}$, and for x and its powers insert $\frac{y}{a}$ and its powers, and the equation becomes $\frac{y^3}{a^2} - \frac{py^2}{a^2} + \frac{qy}{a} - r = 0$, or $y^3 - py^2 + qay - a^2r = 0$

Cor 2 If there are fractions in an equation, they may be taken away, by multiplying the equation by the denominators, and by this proposition the equation may then be transformed into another, without fractions, in which the coefficient of the first term is 1 In like manner may a surd coefficient be taken away in certain cases

Cor 3 Hence also, if the coefficient of the second term of a cubic equation be not divisible by 3, the fractions thence arising in the transformed equation wanting the second term, may be taken away by the preceding corollary But the second term also may be taken away, so that there shall be no such fractions in the transformed equation, by supposing $x = \frac{z \mp p}{3}$, $\pm p$ being the coefficient of the second term of the given equation And if the equation $ax^3 - px^2 + qx - r = 0$ be given, in which p is not divisible by 3, by supposing $x = \frac{z + p}{3a}$, the transformed equation reduced is $z^3 - \overline{3p^2 + 9aq} \times z - 2p^3 + 9apq - 27a^2r = 0$, wanting the second term, having 1 for the coefficient of the first term, and the coefficients of the other terms being all integers, the coefficients of the given equation being also supposed integers

General Corollary to Prop 1, 2 3

If the roots of any of these transformed equations be found by any method, the roots of the original equation, from which they were derived, will easily be found from the simple equations expressing their relation Thus, if 8 is found to be a root of the transformed equation $z^3 + 23z - 696 = 0$, since $x = \frac{z + 2}{5}$, the corresponding root of the given equation $5x^3 - 6x^2 + 7x - 30 = 0$ must be $\frac{8 + 2}{5} = 2$ It is to be observed also, that the reasoning in Prop 2, and 3, and the Corollaries may be extended to any order of equations, though in them it is applied chiefly to cubics

3 General Resolution of Equations

The general resolution of equations of all degrees being the principal object of algebra, various means have been attempted to extend and perfect the theory But the efforts which have yet been made of this kind, have been successful only in solving equations of the first four degrees And even the method for cubic and biquadratic equations has the inconvenience of not always giving the roots under a finite form See BIQUADRATIC and CUBIC But there are in the higher degrees equations subject to certain conditions which either admit a general resolution, or a depression to inferior degrees, and thus diminish the difficulty We shall here give specimens of some of the most useful methods

The most general methods are those by APPROXIMATION, one of which will be explained under that word in this Dictionary, another, which has been much recommended by Dr Hutton, and is the same as the method of Trial-and Error, is as follows

1 Find, by trial, two numbers, as near the true root as possible and substitute them in the given equation instead of the unknown quantity marking the errors which arise from each of them

2 Multiply the difference of the two numbers, found by trial, by the least error, and divide the

product by the difference of the errors, when they are alike, but by their sum when they are unlike. Or say, as the difference or sum of the errors is to the difference of the two numbers, so is the least error to the correction of its supposed number

3 Add the quotient, last found, to the number belonging to the least error, when that number is too little, but subtract it when too great, and the result will give the true root *nearly*

4 Take this root and the nearest of the two former, or any other that may be found nearer, and, by proceeding in like manner, a root will be had still nearer than before, and so on to any degree of exactness required.

Note It is best to employ always two assumed numbers that shall differ from each other only by unity in the last figure on the right, because then, the difference, or multiplier, is only 1

Ex Find the root of the equation

$$x^3 - 15x^2 + 63x = 50$$

Suppose therefore 1·0 and 1·1, and work as follows

1·0	-	x	-	1·1
63·0	-	$63x$	-	69·3
—15	-	$-15x^2$	-	—18·15
1	-	x^3	-	1·1
49	-	sums	-	52·25
—1	-	errors	-	+2·25
3·25	sum of the errors			

As 3·25 : ·1 :: 1 : ·03 correct
1·00

Hence $x = 1·03$ nearly

Again, suppose the two numbers 1·03 and 1·02, &c as follows

1·03	-	x	-	1·02
64·89	-	$63x$	-	64·26
—15·9135		$-15x^2$		—15·6060
1·092727		x^3		1·061208
50·069227		sums		49·715208
+·069227		errors		—·284792
·284792				
·354019	:	·01	::	·069227 : ·0019555

This taken from - 1·03

leaves x nearly = 1·02804

When one of the roots of an equation has been found by approximation, as above, the rest may be found as follows,—Take for a dividend, the given equation, with the known term transposed, with its sign changed, to the unknown side of the equation; and for a divisor, take x minus the root just found Divide the said dividend by the divisor, and the quotient will be the equation depressed a degree lower than the given one

Find a root of this new equation by approximation, as before, and it will be a second root of the original equation. Then, by means of this root, depress the second equation one degree lower, and from thence find a third root, and so on, till the equation be reduced to a quadratic; then the two roots of this being found, by the method of completing the square, they will make up the remainder of the roots. Thus, in the foregoing equation, having found one root to be 1·02804, connect it by means with x for a divisor, and the equation for a dividend, &c as follows:

$$x - 1·02804)\ x^3 - 15x^2 + 63x - 50\ (x^2 - 13·97196x + 48·63627 = 0$$

And the two roots of this quadratic equation, or $x^2 - 13·97196x = -48·63627$, by completing the square, are 6·57653 and 7·39543, which are also the other two roots of the first given cubic equation So that all the three roots of that equation, viz $x^3 - 15x^2 + 63x = 50$,

are 1·02804,	and the sum of all the roots is
and 6·57653,	found to be 15, being equal to
and 7·39543	the coefficient of the second
	term of the equation, which the
sum 15·00000	sum of the roots always ought
	to be when they are right

Sursolid equations may sometimes be resolved without much difficulty when there is a particular relation of the coefficients to the absolute number, or of one coefficient to the rest

Thus, for example, let

$x^5 + Ax^4 + Bx^3 + Cx^2 + Dx + E = 0$, and let $E = \frac{DA}{2} - \frac{CA^2}{4} + \frac{BA^3}{8} - \frac{A^5}{32}$, then will the roots of the following equations be that of the proposed one, viz

$x^4 + px^3 + qx^2 + rx + s = 0$, and $x + p = 0$
where $p = \frac{1}{2}A$, $q = B - \frac{1}{2}A^2$, $r = C - \frac{1}{2}AB + \frac{1}{4}A^3$, and $s = D - \frac{1}{2}CA + \frac{1}{4}A^2B - \frac{1}{16}A^4$ For the two equations multiplied together produce

$$x^5 + \left.\begin{matrix}p\\+p\end{matrix}\right\} x^4 + \left.\begin{matrix}q\\+p^2\end{matrix}\right\} x^3 + \left.\begin{matrix}r\\+pq\end{matrix}\right\} x^2 + \left.\begin{matrix}s\\+pr\end{matrix}\right\} x + ps = 0$$

And the coefficients being equated, we get the values of p, q, r, s, and the particular relation of E, as above

Let this formula be applied to the numeral sursolid equation $x^5 + 26x^4 + 225x^3 + 820x^2 + 1244x + F = 0$, where the coefficients are assumed at pleasure Here then A = 26, B = 225, C = 820, D = 1244, and therefore E, found by the preceding formula for it, will be = 624, the absolute number Hence $p = 13$, $q = 56$, $r = 92$, and $s = 48$, then will the roots of the biquadratic $x^4 + 13x^3 + 56x^2 + 92x + 48 = 0$, be found to be -1, -2, -4, and -6, and consequently those of the proposed equation will be -1, -2, -4, -6, and -13

The following general formula of Dr Clarke's for sursolid equations, may often be of use

If $x^5 + ax^4 + bx^3 + cx^2 + dx + m = 0$, then will x be found by this theorem,

$$x = \frac{4m^{\frac{5}{5}} + 3am^{\frac{4}{5}} + 2bm^{\frac{3}{5}} + cm^{\frac{2}{5}} - m}{d + 5m^{\frac{4}{5}} + 4am^{\frac{3}{5}} + 3bm^{\frac{2}{5}} + 2cm^{\frac{1}{5}}}$$

In which if when the value of $m^{\frac{1}{5}}$ is substituted there is no remainder, the quotient gives one value of x, otherwise, this quotient must be substituted for $m^{\frac{1}{5}}$, and thus repeated till it either terminates or be as near the true root as necessary

The reason of thus assuming $m^{\frac{1}{5}}$ will be obvious, if we consider, that m is always the product of all the roots (having their signs changed), and therefore $m^{\frac{1}{5}}$ will either be a root, or near one

Ex Required the five roots of $x^5 - 23x^4 + 159·25x^3 - 459x^2 + 564·75x - 243 = 0$

Here $m^{\frac{1}{5}} = 3$, which is affirmative because the signs change alternately and $4m^{\frac{5}{5}} = 4m = +972$, $3am^{\frac{4}{5}} = -5589$, $2bm^{\frac{3}{5}} = +8599·5$, $cm^{\frac{2}{5}} = -4131$, $-m = +243$, $d = +564·75$, $5m^{\frac{4}{5}} = +405$, $4am^{\frac{3}{5}} = -$[illegible]

$3bm^3 = +4299{\cdot}75$, and $2cm^3 = -2754$. These values substituted in the general formula give $x=3$ a root. Then, dividing the given equation by $x-3$, we reduce it to this biquadratic, $x^4 - 20x^3 + 99{\cdot}25x^2 - 161{\cdot}25x + 81 = 0$, the roots of which will be found to be 1, 4, 13·5, and 1·5. Hence the five roots of the proposed sursolid are 1, 1·5, 3, 4, and 13·5.

De Moivre's Method.

The equations to which this method applies are called *convertible* or *recurring* equations, since when all the terms are placed on one side the mark of equality, they form expressions such, 1st That the unknown quantity x, and a given quantity k, have together, or separately the same number of dimensions in all the terms. 2dly That the numerical coefficients of the terms equally distant from the two extremes, are the same and have the same sign. Such are the equations

$$x^3 + pkx^2 + pk^2x + k^3 = 0$$
$$x^4 + pkx^3 + qk^2x^2 + pk^3x + k^4 = 0.$$
$$x^5 + k^5 = 0$$

The method of resolving these equations will be obvious from a few examples and if we suppose k to be constantly $=1$, it will not cause any restriction in the method. Let us take for example, $x^4 - px^3 + qx^2 - px + 1 = 0$. The roots of such equations are of the form $a, b, \frac{1}{a}, \frac{1}{b}$.

If a recurring equation be of an odd number of dimensions, it may be easily shewn that one of its roots will be $+1$, or -1, according as the sign of the last term is $-$, or $+$.

The roots of a recurring equation of *even* dimensions, exceeding a quadratic, may be found by the solution of an equation of half the number of dimensions. Let $x^{2n} - px^{2n-1} + qx^{2n-2} \dots + qx^2 - px + 1 = 0$, its root being of the form $a, \frac{1}{a}, b, \frac{1}{b}$, &c may be conceived to be made up of quadratic factors, $x-a$, $x-\frac{1}{a}$; $x-b$, $x-\frac{1}{b}$, &c i. e. if $m = a + \frac{1}{a}$, $n = b + \frac{1}{b}$, &c. of the quadratic factors $x^2 - mx + 1$, $x^2 - nx + 1$, &c Then, multiplying these together, and equating the coefficients with those of the proposed equation, the values of m, n, &c. may be found. Moreover, since the values of x are $a, \frac{1}{a}, b, \frac{1}{b}$, &c and the values of m are $a + \frac{1}{a}$, $b + \frac{1}{b}$, &c there are only half as many values of m as there are of x, and therefore the equation for determining the value of m, will rise to only half the dimensions which x rises to in the original equation.

When the dimensions of a recurring equation are *odd*, since one of its roots is either $+1$, or -1, it may readily be reduced to one of the same kind, of *even* dimensions, by division.

Ex. 1. Let $x^3 - 1 = 0$. One root of the equation being unity, divide $x^3 - 1$ by $x - 1$, and the equation $x^2 + x + 1 = 0$, is obtained, from which we get the other two roots $\frac{-1+\sqrt{-3}}{2}$, and $\frac{-1-\sqrt{-3}}{2}$. These roots are, as is well known, the three cube roots of 1.

In the same manner, the roots of the equation $x^3 + 1 = 0$, are found to be -1, $\frac{1+\sqrt{-3}}{2}$, and $\frac{1-\sqrt{-3}}{2}$.

Ex 2 Let $x^4 - 1 = 0$. Two roots of this equation are $+1$, -1, and by division $\frac{x^4-1}{x^2-1} = x^2 + 1 = 0$, an equation which contains the other two roots $+\sqrt{-1}$ and $-\sqrt{-1}$.

Ex 3 Let $x^4 + 1 = 0$. Assume $\overline{x^2 - mx + 1} \times \overline{x^2 - nx + 1} = x^4 + 1$, that is, $x^4 - \overline{m+n}\,x^3 + \overline{mn+2}\,x^2 - \overline{m+n}\,x + 1 = x^4 + 1$, and by equating the co-efficients, $m+n=0$, and $mn+2=0$; hence $n=-m$, and $-m^2+2=0$, or $m^2=2$, and $m=\pm\sqrt{2}$. Therefore, the two quadratics which contain the roots of the biquadratic, are

$$x^2 + \sqrt{2}\cdot x + 1 = 0, \text{ and } x^2 - \sqrt{2}\,x + 1 = 0,$$

from the solution of which it appears, that the roots are $\frac{-1\pm\sqrt{-1}}{\sqrt{2}}$ and $\frac{1\pm\sqrt{-1}}{\sqrt{2}}$.

In the same manner may the roots of the equations $x^5 + 1 = 0$, and $x^6 + 1 = 0$.

Indeed, the roots of the general equation $x^n \pm 1 = 0$, may readily be ascertained by a table of sines: for, it has been proved by various writers, that if C be assumed to express the cosine of an arc A m times as great as one $\frac{360^\circ}{n}$ whose cosine is denoted by c, then $C - \sqrt{C^2-1} = (c - \sqrt{c^2-1})^m$, and $C + \sqrt{C^2-1} = (c + \sqrt{c^2-1})^m$. Hence, if $x \pm \sqrt{x^2-1}$, be put $= z$, we shall have $z^n = (x \pm \sqrt{x^2-1})^n = X \pm \sqrt{X^2-1}$, x and X being supposed cosines of arcs in the constant ratio of $1 : n$. Therefore, assuming $X = 1 = \cos 0^\circ = \cos 360^\circ = \cos 2\cdot360^\circ = \cos 3\cdot360^\circ$, &c the equation will become $z^n = 1$, or $z^n - 1 = 0$, and the different values of x in the expression $x \pm \sqrt{x^2-1}$ for the root z, will be the cosines of the arcs $\frac{0^\circ}{n}$, $\frac{360^\circ}{n}$, $\frac{2\cdot360^\circ}{n}$, $\frac{3\cdot360^\circ}{n}$, &c those arcs being the corresponding submultiples of the above, answering to the cosine $X=1$.

In like manner if X be taken $= -1 = \cos 180^\circ = \cos 3\cdot180^\circ = \cos 5\cdot180^\circ = \cos 7\cdot180^\circ$, &c then will $z^n = -1$, or $z^n + 1 = 0$ and the values of x will be the cosines of $\frac{180^\circ}{n}$, $\frac{3\cdot180^\circ}{n}$, $\frac{5\cdot180^\circ}{n}$, &c

Euler's Method.

On contemplating the form under which the roots of equations of the first four degrees present themselves when resolved by the ordinary methods, Euler conjectured, that in general the root of an equation of any degree whatever, n, might be represented by the formula $x = A + a\sqrt[n]{r} + b\sqrt[n]{r^2} + c\sqrt[n]{r^3} + \dots k\sqrt[n]{r^{n-1}}$, x being the unknown quantity of the proposed equation, r the unknown quantity of the equation of the order immediately inferior, $n-1$; A, a, b, c, &c. given or determinate coefficients. This manner of considering the roots of equations, serves to resolve a very great number in all degrees. But we must content ourselves with shewing its application to the first degrees.

We shall all along suppose, to simplify the cal-

culus, that the equation to be resolved is deprived of its second term, by the method already explained in this section

Equa. of *second degree* $x^2 + q = 0$

Let us suppose $x = a\sqrt{u}$, and consequently $x^2 - a^2u = 0$. Comparing this equation term by term with the proposed one $x^2 + q = 0$ we have $-a^2u = q$ or (supposing the arbitrary coefficient $a = 1$), $u = -q$, and $\sqrt{u} = \pm\sqrt{-q}$. Therefore $x = \pm\sqrt{-q}$.

Third degree $x^3 + px + q = 0$

Let $x = a\sqrt[3]{u} + b\sqrt[3]{u^2}$ and consequently,

$$x^3 = a^3u + 3a^2bu\sqrt[3]{u} + 3ab^2u\sqrt[3]{u^2} + b^3u^2$$

On the other hand, the formula proposed gives $x^3 = -px - q$, or (putting in the second member for x its supposed value),

$$x^3 = -pa\sqrt[3]{u} - pb\sqrt[3]{u^2} - q$$

Equating respectively the two values of x^3 by making the rational part of the one equal to the rational part of the other, and the radical parts equal each to each of the radical parts corresponding, we shall have $a^3u + b^3u^2 = -q$, $3abu = -p$. Whence we see that between the five quantities p, q, a, b, u, we have simply the two equations just stated. We shall suppose therefore, that the value of one of the two coefficients a and b, that of a for example, is 1; then we shall have between p, q, b, and u, the two equations, $u + b^3u^2 = -q$, and $3bu = -p$. The second gives $b = -\frac{p}{3u}$, which value substituted in the first gives $u - \frac{p^3}{27u} = -q$, whence we deduce

$$u = -\frac{q}{2} \pm \sqrt{\frac{q^2}{4} + \frac{p^3}{27}},$$

$$\text{and } \sqrt[3]{u} = \sqrt[3]{\left(-\frac{q}{2} \pm \sqrt{\frac{q^2}{4} + \frac{p^3}{27}}\right)}$$

Whence, since $b^3u^2 = -q - u$ we shall find

$$b\sqrt[3]{u^2} = \sqrt[3]{-q-u} = \sqrt[3]{-\frac{q}{2} \mp \sqrt{\frac{q^2}{4} + \frac{p^3}{27}}}$$

and, of consequence

$$x = \sqrt[3]{\left(-\frac{q}{2} \pm \sqrt{\frac{q^2}{4} + \frac{p^3}{27}}\right)} + \sqrt[3]{\left(-\frac{q}{2} \mp \sqrt{\frac{q^2}{4} + \frac{p^3}{27}}\right)}$$

Fourth degree $x^4 + px^2 + qx + r = 0$

Let $x = a\sqrt[4]{u} + b\sqrt[4]{u^2} + c\sqrt[4]{u^3}$, or rather (observing that $\sqrt[4]{u^2} = \sqrt{u}$, and transposing the term $b\sqrt[4]{u^2}$), $x - b\sqrt{u} = a\sqrt[4]{u} + c\sqrt[4]{u^3}$

Squaring each member we shall have

$$x^2 - 2bx\sqrt{u} + b^2u = a^2\sqrt{u} + c^2u\sqrt{u} + 2acu$$

or by transposition,

$$x^2 + b^2u - 2acu = (2bx + a^2 + c^2u)\sqrt{u}$$

Squaring *de novo*, putting all in one member, and arranging with respect to x, we shall find

$$\left.\begin{matrix} x^4 - 4acu \\ - 2b^2u \end{matrix}\right\} x^2 - 4bc(a^2 + c^2u)\,x \left.\begin{matrix} - a^4u \\ + b^4u^2 \\ - 4ab^2u^2 \\ + 2a^2c^2u^2 \\ - c^4u^3 \end{matrix}\right\} = 0$$

This equation being compared with the proposed one, equating respectively the corresponding parts, we have

$$-4acu - 2b^2u = p, \quad -4bc(a^2 + c^2u) = q,$$
$$-a^4u + b^4u^2 - 4ab^2u^2 + 2a^2c^2u^2 - c^4u^3 = r$$

As there are four unknown quantities a, b, c, u, and only three equations, suppose $b = 1$; then we shall have the three equations $-4acu - 2u = p$, $-4c(a^2 + c^2u) = q$; $-a^4u + u^2 - 4au^2 + 2a^2c^2u^2 - c^4u^3 = r$. The first gives $4acu = -p - 2u$, or [illegible] $= -pu - 2u^2$, and $4a^2c^2u^2 = \frac{1}{4}(p + 2u)^2$

The second gives $a^2 + c^2u = -\frac{q}{4u}$, and consequently $u(a^2 + c^2u)^2 = \frac{qq}{16u}$, whence we have

$$-a^4u - c^4u^3 + 2a^2c^2u^2 = -\frac{q^2}{16u} + 4a^2c^2u^2 = -\frac{q^2}{16u} + \frac{1}{4}(p + 2u)^2$$

Substituting this value and that of $4acu^2$, in the third equation, we shall find after due reduction

$$u^3 + \frac{pu^2}{2} + \frac{(p^2 - 4r)\,u}{16} - \frac{q^2}{64} = 0, \text{ or}$$

making $u = \frac{1}{4}s$,

$$s^3 + 2ps^2 + (p^2 - 4r)\,s - q^2 = 0$$

This is an auxiliary cubic equation, from which finding s (see CUBICS), we easily ascertain u; then we may determine a and c by means of the equations $-4acu - 2u = p$, $-4u(a^2 + c^2u) = q$. From which the four roots of the original equation become known. See BIQUADRATICS.

A farther developement of this method may be found in *Nouveaux Memoires de l Academie de Petersbourg*, tome IX.

Bezout's Method.

The researches of M. Bezout on equations in general, have considerably extended the class of equations susceptible of a complete resolution. It is the principal object of one of his Memoirs, published among those of the French Royal Academy, in 1762. After having expounded his views on the means of arriving at a general resolution and having made the application to cubic equations, he proposes this problem. *Having given an equation such as* $x^n + px^{n-2} + qx^{n-3} + rx^{n-4}$, &c. $+ M = 0$, *to find the conditions between its coefficients which will reduce it to an equation of the same degree* $y^n + h$. For this last equation is always susceptible of complete solution. To this effect he supposes $y = \frac{a + x}{b + x}$, which gives a new complete equation of the degree n in x, whose coefficients are functions of a and b, of which the progression is regular and elegant. This equation, which is named *auxiliary*, serves to find the value of h and those of a and b, which are the two roots of the equation of the second degree $a^2 - \frac{3qa}{(n-1)p} - \frac{2p}{n(n-1)} = 0$. If now r the coefficient of the following term of the given equation be equal to that of the corresponding term of the auxiliary equation, given in a and b, which are known, the next following to the next, and so on, the two equations will be absolutely equal. We shall, therefore, obtain the root at once, by means of the equation $y^n = -h$, or $y^n = -\frac{a}{b}$, since $h = \frac{a}{b}$, and $y = \sqrt[n]{-\frac{a}{b}}$. This value being substituted in the equation $y = \frac{a + x}{b + x}$, gives a value of x equal to the sum of $n - 1$ mean proportionals between a and b.

Thus, for example, in the equation of the fifth degree $x^5 + px^3 + qx^2 + rx + t = 0$, whatever p and q may be, if r (the coefficient of x) is found equal to the corresponding term of the auxiliary equation, namely, $\frac{1}{2}(n-1)\frac{1}{3}(n-2)\frac{1}{4}(n-3)\,ab\,(a^2 + ab + b^2)$, we shall have x, or, to speak more correctly, one of the values of $x = \sqrt[5]{a^4b} + \sqrt[5]{a^3b^2} + \sqrt[5]{a^2b^3} + \sqrt[5]{ab^4}$. And these four quantities are the four mean proportionals between a and b.

As we obtain by this method only one value of y, and consequently of x, and as one requires as many roots as there are units in n, the Memoir

above cited, shews how the others may be found by means of the multisection of the circle, or of the celebrated COTESIAN *theorem* But what we have here explained must suffice for a concise view of the general method.

4. *Methods of Elimination*

Methods of elimination or extermination, are sometimes useful in depressing the dimensions of equations. Thus, suppose there were given the two equations:

(1). $ax^3 + bx^2 + cx = d$.
(2) $px^3 + rx^2 + sx = t$.

If equa. (1) be multiplied by the second coefficient of x^3, and equa (2) by the first co efficient of that quantity, we should have

(3) $apx^3 + bpx^2 + cpx = dp$
(4) $apx^3 + arx^2 + asx = at$

Whence, by subtraction, there would result

(5) $(bp - ar)x^2 + (cp - as)x = dp - at$:

A quadratic equation easily resolvable by the common methods And in like manner we might reduce two analogous biquadratics to a cubic, and so on.

When the sum, sum of the squares, sum of the cubes, &c of any number of quantities are given, the following general method will be found very simple and convenient

In all equations where the quantities are equally concerned, and all the signs affirmative, the roots of the final equation are the values of all the unknown quantities, and since an equation has as many roots as dimensions therefore by assuming an equation with unknown co efficients, and of as many dimensions as the number of unknown quantities, it is plain, that by determining those coefficients, the roots of such equation will be the quantities required Now, it is known that the co-efficient of the second term is equal to the sum of the roots with a contrary sign, of the third, the sum of the rectangles, of the fourth, the sum of the solids, &c putting $a, b, c,$ &c for the sum of the quantities, sum of the squares, sum of the cubes, &c and A, B, C, &c for the sum, sum of the rectangles, sum of the solids, &c we find

$$A = a,\ B = \frac{-b + a^2}{2},\ C = \frac{c - ab + aB}{3},$$

$$D = \frac{-d + ac - bB + aC}{4},\ E = \frac{e - ad + cB - bC + aD}{5},$$

$$\frac{-f + ae - dB + cC - bD + aE}{6},$$ &c from which the law of continuation is manifest, the denominators proceeding in the order 1, 2, 3, 4, &c and the number of terms in the numerator equal to their corresponding denominators also, the first terms of the numerators of A, B, C, &c are $a, -b, c, -d,$ &c respectively, the second terms of B, C, D, &c are $a^2, -ab, ac, -ad,$ &c respectively, found by multiplying a into each of the terms above; the third terms of C, D, E &c are $aB, -bB, cB,$ &c or B into each of the first terms aforesaid, the fourth terms of D, E, F, &c are C into each of the said first terms respectively, &c &c Or, the nth coefficient will be

$$= \pm \frac{-p + aq - rB + sC - tD +, \text{ \&c to } n \text{ terms},}{n}$$

where p is put for the nth letter of $a, b, c,$ &c q for that next preceding, r for the next preceding that again, &c and the affirmative or negative sign must be taken according as n is an even or an odd number From this expression any of the required coefficients may be easily determined.

Ex 1 Given $\left\{\begin{array}{l} y + z = 5\ (a) \\ y^2 + z^2 = 13\ (b) \end{array}\right\}$ to find y and z

Let $mm - Am + B = 0$, be an equation whose two roots are the values required, then $A\ (= a) = 5$, $B\left(= \frac{a^2 - b}{2}\right) = 6$, and therefore $m^2 - 5m + 6 = 0$, and the roots 2 and 3 are the numbers required.

Ex 2 Given $\left\{\begin{array}{l} w + x + y + z = 14\ (a) \\ w^2 + x^2 + y^2 + z^2 = 54\ (b) \\ w^3 + x^3 + y^3 + z^3 = 224\ (c) \\ w^4 + x^4 + y^4 + z^4 = 978\ (d) \end{array}\right\}$ to find the values of w, x, y, z

Let $m^4 - Am^3 + Bm^2 - Cm + D = 0$, be an equation whose four roots are the values required; then, $A\ (= a) = 14$, $B\left(= \frac{a^2 - b}{2}\right) = 71$, $C\left(= \frac{c - ab + aB}{3}\right) = 154$, $D\left(= \frac{ac - bB + aC - d}{4}\right) = 120$ therefore $m^4 - 14m^3 + 71m^2 - 154m + 120 = 0$; and the roots 2, 3, 4, and 5 the values sought.

Ex 3 Given $\left\{\begin{array}{l} v + w + x + y + z = 20(a) \\ v^2 + w^2 + x^2 + y^2 + z^2 = 90(b) \\ v^3 + w^3 + x^3 + y^3 + z^3 = 440(c) \\ v^4 + w^4 + x^4 + y^4 + z^4 = 2274(d) \\ v^5 + w^5 + x^5 + y^5 + z^5 = 12000(e) \end{array}\right\}$ to find $v, w, x, y,$ and z

Let $m^5 - Am^4 + Bm^3 - Cm^2 + Dm - E = 0$ be an equation whose five roots are the values required, then, working as in the preceding examples, we shall find $A = 20$, $B = 155$ $C = 580$, $D = 1044$, and $E = 720$, therefore $m^5 - 20m^4 + 155m^3 - 580m^2 + 1044m - 720 = 0$, and the roots 2, 3, 4, 5, and 6, the values required

For information on various subjects connected with Algebra, the reader may farther consult the articles APPLICATION *of Algebra to Geometry*, APPROXIMATION, BINOMIAL, BIQUADRATICS, CUBICS, CURVES, DEPRESSION DIOPHANTINE, EXPEDIENT, ROOT, SERIES, &c

ALGEBRAICAL, *a* relating to algebra as algebraical characters, solutions, curves, &c

ALGEBRAICAL CURVE, is a curve in which the general relation between the absciss and the ordinates may be defined by an algebraical equation These are also called geometrical lines, or curves, in contradistinction to mechanical or transcendental ones

ALGEBRAIST, a person skilled in algebra

ALGEDO, (from αλγος, *pain*,) a term appropriated to express any violent pain about the anus, perinæum, testes, urethra and bladder, arising from an abrupt suppression of a gonorrhœal discharge

ALGEMA, (αλγημα, from αλγεω, *to be in pain*) uneasiness or pain of any kind.

ALGENEB, or ALGENIB, a fixed star of the second magnitude, in Perseus's right side, marked *α* by Bayer

ALGEROTH, (from *Algeroth*, the name of its inventor, a physician of Verona) The mercurius vitæ, or antimonial part of butter of antimony, separated from some of its acid by washing it in water

ALGIABARII, a Mahometan sect of predestinarians

ALGID, (*algidus*, from *algeo*, to be cold,) chilled cold, numbed

ALGIDITY. *s*. Chilness; cold.

ALGIERS, a kingdom of Africa, now one of the states of Barbary It extends 460 miles in length from east to west, and is very unequal

in breadth; some places being scarce 40 miles broad, and others upwards of 100. It is bounded on the N by the Mediterranean; on the E by the river Zaine, the ancient Tusca, which divides it from Tunis; on the W by the Mulvya, and the mountains of Trava, which separate it from Morocco; and on the S by the Sahara, Zaara, or Numidian desert. The Algerine kingdom made formerly a considerable part of the Mauritania Tingitana, which was reduced to a Roman province by Julius Cæsar, and from him also called Mauritania Cæsariensis.

ALGIERS, a city, the capital of the above kingdom, and probably the ancient Icosium; by the Arabians called Algezair, or rather Al-Jezerah, i. e. the island, because there was an island before the city, to which it hath been since joined by a mole. The number of its inhabitants is said to be about 100,000 Mahometans, 2500 Jews, and 1500 Christians. Lat. 36. 50. N. Lon. 2. 13 E.

ALGIFIC. *a.* (from *algor*, Lat.) That produces cold.

ALGOL, the fixed star in Caput Medusæ, and marked *β* in Perseus. This star is subject to periodic variations in its brightness. It changes from the second magnitude to the fourth in about three hours and a half, and back again in the same time; when it continues of the greatest brightness for about two days and seven hours, then it changes again. Phil. Trans. 1783. Mr Goodricke and others have speculated upon the cause of these variations; but their conjectures are not worth detailing.

ALGOMEYSA, in astronomy, the same as Procyon.

ALGOR, (*algeo*, to be cold.) Chilliness or rigor. A disease enumerated in the nosologies of Sauvages and Sagar.

ALGORAB, a star of the third magnitude, marked *γ* in Corvus.

ALGORITHM, ALGORISM, Arabic words expressive of numerical computation; they are now generally used to denote the rudimental and operative part of either arithmetic or algebra.

ALHABOR, among Arabian astronomers, the star commonly called Sirius.

ALHANDAL, (*alhandel*, Arab.) The colocynth, or bitter apple.

ALHAZEN, ALLACEN, or ABDILAZUM, was a learned Arabian, who lived in Spain about the year 1100, according to his editor Risner, and Weidler. He wrote upon astrology; and his work upon optics was printed, in Latin, at Basil, in 1572, under the title of Opticæ Thesaurus, by Risner. Alhazen was the first who shewed the importance of refraction in astronomy, so little known to the ancients. [illegible] the first author who has [illegible] which he wrote, [illegible] speaks of the [illegible]

[illegible] from [illegible] of [illegible]

prisms. This is otherwise called [illegible] line.

ALI, gives the denomination to a sect, or division, among the Mahometans, who adhere to the right of succession of Ali, the fourth caliph, or successor of Mahomet, and the reform of mussulmanism introduced by him.

The sectaries of Ali are more particularly called Schiites, and stand opposed to the Sunnites, or sect of Omar, who adhere to the law as left by Mahomet, Abubeker, and Omar.

Ali was cousin of Mahomet, and son-in-law of that prophet, having married his daughter Fatimah. After Mahomet's death, great disputes arose about the succession; many stood for Ali, but Abubeker was preferred, and elected the first kaliph. Ali took his turn, after the death of Othman.

This Ali, sitting one day with a company of young men who were conversing on the elegance and pleasantness of different things; when it came to his turn to speak, said, "The handsomest dress is a coat of mail, and the best covering for the head, is a helmet; the pleasantest beverage is the blood of our enemies, the most agreeable shade is that of spears; the most delightful music is the neighing of the caparisoned war-horse, and the most estimable companions, are warriors and valiant heroes." This blood-thirsty sublimity would have done honour to him "who was a murderer from the beginning," rather than to the founder of a sect, even of Mahometans. This Ali, likewise called Lion of God, composed some verses in the same mild spirit, from which we select the following.

"The sword and the hanger are my fragrant bowers;
Despicable in my judgment are the narcissus and myrtle. [enemies,
Our wine is made from the blood of our
And our cups are formed out of their skulls."

A literary gentleman connected with the Eclectic Review, exclaimed on reading these verses, "Bravo! Lion of God, true son of Apollyon!—Tisiphone herself cannot match this saying. The man whose ruthless soul was capable of framing it bids fair to be devil when Satan dies!"

ALIA, ἁλια, in Grecian antiquity, solemn games celebrated at Rhodes, on the 24th day of the month Gorpiæa, corresponding to the Athenian Boedromion, in honour of the sun, ἡλιος, or ἁλιος, who is said to have been born there.

ALIA SQUILLA, (from ἁλιος, *marine*, and σκιλλα, *a shrimp*.) The prawn or sea-shrimp.

ALJAMEIA, is a name which the Moriscoes in Spain gave to the language of the Spaniards.

ALIAS *ad.* A Latin word, signifying otherwise, as, Mallet, alias Malloch; that is, otherwise Malloch.

ALIAS, in law, a second writ, issued from the courts of Westminster, after a capias, &c. sued out without effect.

ALIBI, in law, denotes the absence of the

removed from the place where he is charged with having committed a crime, or his being elsewhere at the time specified.

ALIBLE. a. (alibilis, Latin.) Nutritive, nourishing; that may be nourished.

ALICANT, a sea-port town of Valencia, in Spain, famous for its harbour, which is defended by strong bastions. Lat. 38. 24. N. Lon. 0. 36. W.

ALICARIÆ, in ancient history, prostitutes.

ALICUDA, or ALICUR, one of the Lipara islands near the coast of Sicily. Lat. 38. 21. N. Lon. 14. 62. E. This island is about six miles in circuit, and has about 650 inhabitants, who are fishermen and farmers, and extremely industrious. The most interesting account of this island we know, is to be found in the third volume of Spallanzani's Travels in the Two Sicilies.

ALICULA, in antiquity, a habit worn by the Roman children.

ALIDADE. See ALHIDADE.

A'LIEN. a. (alienus, Lat.) 1. Foreign, or not of the same family or land (*Dryden*). 2. Estranged from; not allied to (*Rogers*).

A'LIEN. s. (alienus, Lat.) 1. A foreigner, not a denizen; one not allied, a stranger (*Ad.*).

ALIEN, in law, a person born out of the king's allegiance, in contradistinction to a denizen, or natural subject. The word is formed from the Latin alias, "another," q. d. one born in another country. An alien is incapable of inheriting lands in Britain till naturalized by an act of parliament. No alien is entitled to vote at the election of members of parliament; nor can he enjoy any office, or be returned on any jury, unless where an alien is party in a cause, when the inquest is composed of an equal number of denizens and aliens. The reasons for establishing these laws were, that every man is presumed to bear faith and love to that prince and country where he received protection during his infancy, and that one prince might not settle spies in another's country, but chiefly, that the rents and revenues of the country might not be drawn to the subjects of another. Some have thought that the laws against aliens were introduced in the time of Henry II. Others that it is an original branch of the feudal law: for by that law no man can purchase any lands but he must be obliged to do fealty to the lords of whom the lands are holden, so that an alien who owed a previous faith to another prince, could not take an oath of fidelity in another sovereign's dominions. Among the Romans, only the Cives Romani were esteemed freemen, but when their territories increased, all born within the pale of the empire were considered as citizens.

ALIEN DUTY, an impost laid on all goods imported by aliens, over and above the customs paid for such goods, imported by British and on British bottoms.

To A'LIEN. v. a. (aliener, Fr. alieno, Lat.) 1. To make any thing the property of another (*Hale*). 2. To estrange; to turn the mind or affection; to make averse (*Clarendon*).

A'LIENABLE. a. (from *To alienate*.) That of which the property may be transferred (*Dennis*).

To A'LIENATE. v. a. (aliener, Fr. alieno, Lat.) 1. To transfer the property of any thing to another (*Bacon*). 2. To withdraw the heart or affections (*Till.*).

A'LIENATE. a. (alienatus, Lat.) Withdrawn from; stranger to (*Swift*).

ALIENATIO MENTIS, ALIENATION OF MIND. See DELIRIUM.

ALIENA'TION. (alienatio, Lat.) 1. The act of transferring property (*Atterb.*). 2. The state of being alienated. 3. Change of affection (*Bacon*). 4. Disorder of the faculties (*Hooker*).

ALIENATION, ALIENATIO, in law, the act of making a thing another man's; or the altering and transferring the property and possession of lands, tenements, or other things, from one man to another. To alienate, or alien, in mortmain, is to make over lands or tenements to a religious community, or other body politic. To alienate in fee, is to sell the fee-simple of any land, or other incorporeal right. All persons who have a right to lands, may generally alien them to others; but some alienations are prohibited; such as alienations by tenant for life, &c. whereby they incur a forfeiture of their estate. 1 Inst. 118.

ALIENOUS, ALIENUS, (alieno, to estrange.) In medicine, any thing foreign to the sound properties of the body.

ALIFORM, (aliformis, from ala, a wing, and forma, a likeness.) Winglike, pennated, pinnated.

ALIFORMES MUSCULI. See PTERYGOID MUSCLES.

ALIMENT, (from alo, to nourish,) implies food both solid and liquid, from which, by the process of digestion, chyle is prepared; and this being absorbed by the lacteal vessels, and conveyed into the circulation, is there assimilated into the nature of blood, so as to afford that supply of nutrition which the continual waste of the body is known to require.

ALIMENTAL. a. (from aliment.) That has the quality of aliment; that does nourish; that does feed (*Brown*).

ALIMENTARII PUERI, &c. were certain children maintained and educated by the munificence of the Roman emperors, in a sort of public places, not unlike our hospitals.

ALIMENTARINESS. s. (from alimentary.) The quality of being alimentary.

ALIMENTARY. a. (from aliment.) 1. That belongs to aliment (*Arbuthnot*). 2. That has the power of nourishing (*Ray*).

ALIMENTARY DUCT, a name by which some call the intestines, because the food passes through them.

ALIMENTATION. s. (from aliment.) 1. The quality of nourishing. 2. The state of being nourished (*Bacon*).

ALIMONIOUS. a. (from alimony.) That does nourish (*Harvey*).

ALIMONY, ALIMONIA, properly signifies nourishment, or maintenance; but in a

modern sense, in law, it denotes that portion, or allowance, which a married woman sues for, upon any occasional separation from her husband, wherein she is not charged with elopement or adultery

ALINDESIS, in ancient gymnastics, an exercise in which persons besmeared themselves all over with oil, and then rolled about, naked, in the dust

ALIPILARIUS, in Roman antiquity, an attendant at the baths, who took off the hairs from persons' armpits, legs, &c this being deemed a point of cleanliness

ALIPTA, an officer anciently appointed to anoint the athletæ Hence we have ALIPTERIUM, the place where this anointing was performed

ALIPTES, the name of a fountain near Ephesus

ALIQUANT PART, in arithmetic, is that number which cannot measure any other exactly without some remainder Thus 7 is an aliquant part of 16, for twice 7 wants 2 of 16, and 3 times 7 exceeds 16 by 5

ALIQUOT PART, is that part of a number or quantity which will exactly measure it without any remainder Thus 2 is an aliquot part of 4, 3 of 9, 4 of 16, &c All the aliquot parts of any number may be thus found Divide the given number by its least divisor, then divide the quotient also by its least divisor, and so on, always dividing the last quotient by its least divisor, till the quotient 1 is obtained, and all the divisors, thus taken, are the prime aliquot parts of the given number Then multiply continually together these prime divisors, viz every two of them, every three of them, every four of them, &c, and the products will be the other or compound aliquot parts of the given number So if the aliquot parts of 60 be required, first divide it by 2, and the quotient is 30 then 30 divided by 2 also, gives 15, and 15 divided by 3 gives 5, and 5 divided by 5 gives 1 so that all the prime divisors or aliquot parts are 1, 2, 2, 3 5 Then the compound ones, by multiplying every two, are 4, 6, 10, 15, and every three 10, 20, 30 So that all the aliquot parts of the given number 60, are 1, 2, 3, 4, 5, 6, 10, 12 15, 20, 30

ALISE, or ALESIA STE REINE, in geography, a small town of France, in the department of the Cote d'Or, eight miles N E of Semur-en-Auxois This town was the ancient Alesia

ALISH *a* (from *ale*) Resembling ale (*Mor*)

ALISMA Water plantain A genus of the class and order hexandria, polygynia Calyx three-leaved, petals three, capsules numerous, aggregate, mostly one-seeded It comprises ten species traced in different parts of Europe, Africa, and America three of which are inhabitants of the swamps and pools of our own country

ALISPHLIS, ([illegible] *salt*) Sal ammoniac

ALITURA, ALITURE

[illegible]) Food, aliment, alimony

ALIVE *a* (from *a* and *live*) 1 In the state of life, not dead (*Dryden*) 2 Unextinguished, undestroyed; active, in full force (*Hooker*) 3 Cheerful, sprightly (*Clarissa*) 4 It is used to add an emphasis: as, the best man *alive* (*Clarendon*)

ALKAHEST, or ALCAHEST, among alchymists, a universal menstruum, or a liquor which has the power of resolving all things into their first principles The word was invented by Paracelsus, and applied by him to a remedy which he asserted to be sovereign against the dropsy, and all diseases of the liver; but his pupil Van Helmont, desirous of exalting its fame, ascribed to it such wonderful properties as exceed credibility He pretended that it was capable of dissolving all substances into a liquor, which rises wholly in distillation, leaving no fæces behind, at the same time that the alkahest itself spontaneously separates from the body on which it has produced so remarkable a change The substances thus acted upon retain, however, their essential properties, but by further digestion with the alkahest, are all resolved into the same scentless, insipid, elementary water

With the secret of preparing this extraordinary liquor, Helmont professed himself to be acquainted, and solemnly affirmed that he once had some of it in his possession That these pretensions should gain credit, when it is so evident that no such liquor could exist (for no vessel can contain that which is capable of dissolving all things), may appear wonderful, but when we reflect on the extreme ignorance of the age, with respect to physical subjects, on the importance to which the alchemists had raised themselves, and on the extensive utility of such an alkahest, if attainable, and when we consider also that "what men wish they easily believe," we shall be the less surprised at the avidity with which this, and other notions equally absurd, were propagated and received

ALKAHEST OF RESPOUR, a mixture of potash with oxyd of zinc, to which he ascribed the power of dissolving all metals

ALKAHESTIC, is sometimes used to denote the quality of bodies that are powerfully solvent In this sense, it is nearly the same as menstruous, only it expresses a greater degree of solving power

ALKALESCENT, is used to denote a substance slightly alkaline, or in which an alkali is beginning to be formed and to predominate It is generally applied to the production of volatile alkali, or ammonia, by putrefaction Some species of vegetables, particularly those of the tetradynamic class, are also called alkalescent, because, when placed in circumstances favourable to fermentation, they have a tendency to produce ammonia, which may be separated by distillation

ALKALI, a general term for an order of salts of great use and importance There are two kinds of alkalies, the fixed, which have no smell, and the volatile, which have a pungent one Of the former kind there are two—Potassa,

Potash, or the vegetable fixed alkali, and Soda, or the mineral fixed alkali, of the latter there is but one species, which is called Ammonia

The word alkali is derived from the Arabic alkhalet, burnt, and was originally applied to the salt extracted from the ashes of the plant kali, or glass-wort The same salt is also found native in great quantities, mixed with sea-salt in the waters and on the shores of several lakes of Lower Egypt, and has been known from time immemorial, by the name of natron, or the nitre of the ancients The Greeks and Romans called the fixed alkali, lixiviary salt, because they obtained it by lixiviating the ashes of certain vegetables

The general properties of alkalies, which are common to them all, are the following —1 A peculiar acrid taste, which acts with so much energy as to corrode the tongue 2 The power of changing the blue colours of vegetables green from this, however, there are deviations, for they change the red of archil or litmus to a blue, and the yellow of turmeric, as well as the light brown of many roots and woods, to a dull red 3 They are highly soluble in water, giving out heat on their union 4 They corrode woollen cloth, and if strong, reduce it to the form of a jelly 5 They render oils miscible with water, by uniting with them, and forming with them the well known compound, soap 6 Combined with sulphur they form alkaline hepars, or livers, now called alkaline sulphurets 7 With the acids they form neutral salts, of different degrees of solubility, these are distinguished by different names, according to the acid and the alkali employed, thus, a salt formed by the union of sulphuric acid with potash, is called sulphat of potash, that composed of nitric acid and soda, is called nitrate of soda, and so on

Beside these characteristic properties of alkalies, each species possesses others peculiar to itself, the most material of which we shall state, referring for more particular information to the separate articles Potash, Soda, Ammonia

The fixed alkalies are so called because they are not volatilized without an intense heat* they melt, however, with a moderate degree of heat, and, uniting with earthy substance, form glass They will also dissolve by heat all the metallic oxyds, and assist in the fusion of all earthy and metallic mixtures When pure and solid, they are remarkably deliquescent, absorbing water from the atmosphere or any surrounding medium, so that they are sometimes used to render the air of vessels perfectly dry Both the fixed alkalies, Potash and Soda, have these properties, but with some variation, which can scarcely be observed when both are in a state of purity it is only in their combinations that the difference of their natures can be distinguished From these combinations it appears that they differ from each other in the strength of their affinity with acids, which is greater in the former, in a slight degree in their action on oils and animal fats, but chiefly in the neutral salts which they produce with acids, which in all cases differ in form of crystallization, in solubility, often in taste, and in several other particulars

Potash is called the vegetable alkali, because it is procured from the ashes of all vegetables, in a greater or less proportion, except marine plants, and a few that grow near the sea-shore, which yield soda This latter is termed the mineral alkali, because it is not only obtained from the ashes of the last-mentioned plants, but is sometimes found native in the earth Potash is also formed by the burning of tartar, hence called salt of tartar, but the purest of all is obtained from the deflagration of nitre the charcoal uniting with the acid as it assumes the form of oxygen gas, and the alkali being left behind The most common alkali, but the least pure, is that of the ashes of common hearths, where wood is burnt The ashes of horse-chesnuts contain a large quantity of it Deyeux and Vauquelin assert that a pound of these ashes will yield more than six ounces of potash, and that the same quantity of burnt husks affords nearly as much It appears, however, that the fruit of the Spanish lilac, or syringa vulgaris of Linnéus, contains the greatest quantity of this alkali, for according to the abovementioned chemists, its ashes will yield pure alkali in the proportion of eight ounces and three drachms to a pound —The dry leaves of the beech-tree, also, afford potash in great abundance M Jacobson asserts that ten pounds weight of the ashes thence obtained will furnish as much as thirty pounds will of common wood-ashes ——Soda is found in the ashes of sea-weed It is likewise the basis of sea salt, from which it is separated by several processes, but especially by the oxyd of lead, which has a stronger affinity for the muriatic acid with which the soda is found combined When exposed to atmospheric air, it attracts its moisture, (like potash), and the peculiar acid it contains, so as to become gradually a neutral salt, but if the atmosphere be dry, the alkali loses its water, and then it is said to effloresce in this state it is often found on old walls The uses of soda, like those of potash, are very great in the making of glass, soap, &c It has also been lately prepared and sold in a proper form for washing linen.

With respect to the intimate nature of the fixed alkalies, chemists are yet ignorant †

* This is true of those alkalies, in their usual state, combined as they are with carbonic acid and other substances, but in a state of purity, Mr Chenevix has frequently volatilized soda in a good red heat, and potash, he says, is still less fixed. It is, therefore, very questionable whether the designation imposed upon them when they were imperfectly known, ought to be continued. It would, however, be improper for us to omit the term in a work designed for reference, as it is employed in almost every publication on chemistry.

† Though a very valuable approach appears to be made towards a discovery of their nature by a series of electric experiments lately made upon them by Mr Davy, and which it is our intention to notice at length in the article Oxygen, that we may give one connected view of the whole

Ammonia, or the volatile alkali, is procured by decomposition, from all animal, and from some vegetable substances, and by putrefaction from all these matters It is distinguished from the fixed alkalies by its volatility, which is so great that it very easily assumes a gaseous form, and is dissipated by a very moderate degree of heat; and by its pungent smell Its purest form is that of a gas it is never solid, unless combined with some other substances, nor liquid but when it is united with water It is weaker in all its affinities than the fixed alkalies, and is composed of hydrogen and azote, in the proportion of 193 parts of the former to 807 of the latter

Ammonia, which is the hartshorn sold in commerce, is procured by burning animal substances, in Egypt, from whence, in the state of sal ammoniac, it used to be imported, it was made from camel's dung, but now it is generally obtained among us from bones, by distillation Dr Pearson recommends to employ the ancient name alkali for the genus, and the ancient names of these salts for the species, abbreviated thus into one word, viz Veg-alkali, Fos-alkali, and Vol-alkali

Alkalies are either mild, or caustic In the first state they are combined with fixed air, or carbonic acid gas, which moderates their action, and which occasions them to effervesce with acids—a character formerly thought to be essential to alkalies in general, but now known to depend upon the expulsion of the acid to which they are united In their second or caustic state, the carbonic acid is separated from them by lime, which thus renders them more pure and increases the energy of their action All the mild or effervescent alkalies, then, in the new nomenclature, are really carbonats of potash, soda, or ammonia, and the caustic alkalies are the only ones that exist in a state of purity See CARBONATE

ALKALI, FLUOR, a solution of pure ammonia in water

ALKALI, PHLOGISTIC or PRUSSIAN, is prepared by calcining carbonat of potash with bullock's blood or other animal matter, in which process it unites with the prussic acid formed during the calcination See PRUSSIATE OF POTASH AND IRON

ALKALI OF TARTAR, or SALT OF TARTAR, a mild vegetable fixed alkali, prepared by the combustion of tartar The name is applied to any pure carbonat of potash, in common language and in medicine

ALKALI, in botany See SALICORNIA

ALKALINE, in a general sense, something that has the properties of an alkali

ALKALINE EARTHS, or salino-terrene sub[illegible] called by Fourcroy, are those [illegible] both of earths and [illegible] those earths which [illegible] in [illegible] in water, [illegible] extent, and [illegible] it [illegible] the property of changing to green [illegible] and red vegetable colours, of [illegible] carbonic acid with eagerness, and of [illegible] when pure, those caustic or acrid qualities that so much distinguish the alkalies These earths are barytes, magnesia, lime, and strontian, whose saline properties generally predominate over their earthy ones

ALKALINE GAS, ammonia in a state of vapour See AMMONIACAL GAS

ALKALINE SALTS, in common language, are the alkalies themselves, considered in a medical point of view, they are known to possess antiseptic powers When regarded more strictly as alkaline neutral salts, they are combinations of alkalies with acids their number is equal to the product of the number of acids, and three, the number of alkalies

ALKALINE SULPHURES, or SULPHURETS, called also alkaline liver of sulphur, are combinations of sulphur with each of the alkalies For an account of them, see SULPHURET OF POTASH, OF SODA, and OF AMMONIA

ALKALIZATION, the act of impregnating a liquor with an alkaline salt This is done either to make it a better dissolvent, for some particular purposes, or to load the phlegm, so that it may not rise in distillation, whereby the spirituous parts may go over more pure

ALKALIZATION, is also a name applied to operations, by which alkaline properties are communicated to bodies, or to those by which alkali is extracted from bodies which contain it or in which it may be formed, e g spirit of wine is said to be alkalized, when it has been digested upon alkali, a part of which it dissolves, and thence acquires alkaline properties On the other hand, when a neutral salt is decomposed in order to obtain its alkaline basis, this salt is said to be alkalized Vegetable substances, when reduced to ashes, may also be said to be alkalized, because these ashes contained fixed alkali

To ALKALIZATE *v a* (from *alkali*) To make alkaline

ALKALIZATE *a* (from *alkali*) Having the qualities of alkali (*Newton*)

ALKANET, in botany See LITHOSPERMUM

ALKANNA See ANCHUSA

ALKANNA VERA Alkanna orientalis An oriental plant, the Lawsonia inermis, ramis inermis, of Linneus, principally employed in its native place as a dye The root is the officinal part, which, however, is rarely met with in the shops It possesses adstringent properties, and may be used as a substitute for the anchusa

ALKARVA, (*alkarvah*, Arab) The herb ricinus or palma Christi, from the seeds of which is made the castor oil

ALKEKENGI, (*alkekengi*, Arab) Halicacabum Winter cherry This plant, physalis alkekengi, foliis geminis integris acutis, caule herbaceo, inferne subramoso, of Linnéus, is cultivated in our gardens The berries are recommended as a diuretic, from six to twelve for a dose, in dropsical and calculous diseases See PHYSALIS

ALKERMES, in pharmacy, a compound cordial confection, made of various ingredients

as rose-water, sugar, cinnamon, aloes-wood, &c but the principal one is kermes It is now disused

ALKES, or ALCHES, the star marked α in Crater

ALKOHOL, or ALKOOL See ALCOHOL

ALKORAN See ALCORAN

ALKUSSA, in ichthyology, a species of silurus

ALKY OF LEAD, among alchemists, a sweet substance procured from lead

ALL, *a* (all, Saxon) 1 The whole number, every one (*Tillotson*) 2 The whole quantity, every part (*Locke*)

ALL *s* 1 The whole (*Prior*) 2 Every thing (*Shakspeare*)

ALL *ad* (See ALL *a*) 1 Quite, completely (*Locke*) 2 Altogether, wholly (*Dry*)

All is much used in composition

ALL-SAINTS, in the calendar, a festival celebrated on the first of November, in commemoration of all the saints in general this is otherwise called All-hallows.

ALL-SOULS, in the calendar, a festival held on November the second, in commemoration of all the faithful deceased

ALLA, or ALLAH, the name by which the professors of Mahometanism call the Supreme Being The term alla is Arabic, derived from the verb alah, to adore It is the same with the Hebrew Eloah, which signifies the Adorable Being

ALLA MADRE, (Ital) To the Mother i e To the Virgin Mary, an expression written at the beginning of hymns addressed to the Virgin

ALLA SICILIANA, a musical expression which implies a certain species of air generally written in $\frac{6}{8}$ or $\frac{12}{8}$ though sometimes in $\frac{6}{4}$ Its principal characteristics are its being in a somewhat slow time, and chiefly moving by alternate crotchets and quavers, if in $\frac{6}{8}$ or $\frac{12}{8}$, and in minims and crotchets, if in $\frac{6}{4}$, in either case uniformly having the longest note at the theses or points of accentuation

ALLANTOID MEMBRANE, (Membrana allantoidea, from αλλας, *a sausage, or hog's pudding*, and ειδος, *likeness*, because in some brute animals it is long and thick) A membrane of the fœtus, peculiar to brutes, which contains the urine discharged from the bladder See COW

ALLANTOIS, (from αλλα, and ειδος) A thin bladder of any kind employed in chemical purposes

To ALLAY *v a* (from *alloyer*, Fr) 1 To mix one metal with another, to make it fitter for coinage In this sense, most authors write alloy (See ALLOY) 2 To join any thing to another, so as to abate its predominant qualities (*South*) 3 To quiet, to pacify, to repress (*Shakspeare*)

ALLA'Y *s* (*alloy*, Fr) 1 The metal of a baser kind mixed in coins, to harden them, that they may wear less (*Hud*) 2 Any thing which, being added, abates the predominant qualities of that with which it is mingled

ALLA'YER *s* (from *allay*) The person or thing which has the power or quality of allaying (*Harvey*)

ALLA'YMENT *s* (from *allay*) That which has the power of allaying (*Shakspeare*)

ALL-BEA'RING *a* (from *all* and *bear*) Omniparous (*Pope*)

ALL-CHEE'RING (*a*. from *all* and *cheer*) That gives gaiety to all (*Shakspeare*)

ALLCHURCH, a village of Warwickshire, once seven miles in circumference The Roman Icknield-street passes through it This village was formerly a borough, and had a market, and several streets, the names of which are now lost The bishop of Worcester had formerly a palace here, and the church, several parts of which are of Saxon architecture, contains many antique monuments It is five miles from Bromsgrove, in the road to Leicester.

ALL-CONQUERING *a* That subdues every thing (*Milton*)

ALL-DEVOU'RING *a* (from *all* and *devour*) That eats up every thing (*Pope*)

ALLEGANY, or APPALACHIAN MOUNTAINS, the general name of a long range of mountains in North America, between the Atlantic, the Mississippi, and the Lakes. They extend north-easterly and south-westerly, nearly parallel with the sea coast, about 900 miles in length, and from 60 to 200 in breadth. The different ridges which compose this immense range have different names in the different states Advancing from the Atlantic, the first ridge in Pennsylvania, Virginia, and North Carolina, is the Blue Ridge, or South Mountain, from 130 to 200 miles from the sea, and about 4000 feet high from its base Between this and the North Mountain, spreads a large fertile vale Next lies the Allegany, which is the principal ridge, and has been descriptively called the back-bone of the United States. Beyond this is the long ridge called the Laurel Mountains, in a spur of which, in lat 36°, is a spring of water, fifty feet deep, very cold, and as blue as indigo From these several ridges proceed innumerable nameless branches or spurs The Kittatiny, or Blue Mountains, run through the northern parts of New Jersey and Pennsylvania The general name for these mountains seems not yet to have been determined Mr Evans, an American geographer, calls them the Endless Mountains others have called them the Appalachian, from a tribe of Indians, who live on a river proceeding from the ridge, called the Appalachikola But the most common, and, no doubt, the most proper name, is the Allegany Mountains, so called from the principal ridge. These mountains are not confusedly scattered and broken, rising here and there into high peaks overtopping each other, but stretch along in uniform ridges, scarcely half a mile high. They spread as we proceed south, and some of them terminate in high perpendicular bluffs. Others gradually subside into a level country, giving rise to the rivers which run southerly into the gulf of Mexico

ALLEGATION *s* (from *allege*) 1 Affirmation, declaration 2 The thing alleged or affirmed (*Shakspeare*). 3 An excuse; a plea (*Pope*)

To **ALLE'GE** *v a* (*allego*, Latin) 1 To affirm, to declare, to maintain 2 To plead as an excuse, or argument (*Locke*)

ALLEGEABLE *a* (from *allege*) That may be alleged (*Brown*)

ALLEGEAS, a stuff manufactured in the East Indies, sometimes of cotton, at others of herbs spun like flax

ALLE'GEMENT *s* (from *allege*) The same with *allegation*

ALLEGER *s* (from *allege*) He that alleges (*Boyle*)

ALLEGIANCE, in law, is the tie which binds the subject to the king, in return for that protection which the king affords the subject The thing itself, or substantial part of it, is founded in reason and the nature of government, the name and the form are derived to us from our Gothic ancestors In Britain, on its becoming a settled principle of tenure, that all lands in the kingdom were holden of the king as their sovereign and lord paramount, no oath but that of fealty could ever be taken to inferior lords; and the oath of allegiance was necessarily confined to the person of the king alone By an easy analogy, the term of allegiance was soon brought to signify all other engagements which are due from subjects to their prince, as well as those duties which were simply and merely territorial, and the oath of allegiance, as administered in England for upwards of 600 years, contained a promise to be true and faithful to the king and his heirs, and truth and faith to bear of life and limb and terrene honour, and not to know or hear of any ill or damage intended him, without defending him therefrom But, at the Revolution, the terms of this oath being thought perhaps to favour too much the notion of non-resistance, the present form was introduced by the convention parliament, which is more general and determinate than the former, the subject only promising "that he will be faithful and bear true allegiance to the king," without mentioning "his heirs," or specifying in the least wherein that allegiance consists This oath must be taken by all persons in any office trust, or employment, and may be tendered by two justices of the peace to any person whom they shall suspect of disaffection And the oath of allegiance may be tendered to all persons above the age of twelve years, whether natives, denizens, or aliens

But, besides these express engagements, the law also holds that there is an implied, original, and virtual allegiance, owing from every subject to his sovereign, antecedently to any express promise, and although the subject never swore any faith or allegiance in form Allegiance, both express and implied, is also distinguished by the law into two species, the one natural, and the other local; the former being perpetual, the latter temporary.

It seems fairly presumable, that the convention parliament, which introduced the oath of allegiance in its present form, did not intend to exclude all resistance, since the very authority by which the members sat together, was itself the effect of a successful opposition to an acknowledged sovereign.—Again The allegiance above described can only be understood to signify obedience to lawful commands If, therefore, the king should issue a proclamation, levying money or imposing any service or restraint upon the subject, beyond what the law authorised, there would exist no sort of obligation to obey such a proclamation, in consequence of having taken the oath of allegiance —Neither can allegiance be supposed to extend to the king after he is actually and absolutely deposed, driven into exile, or otherwise rendered incapable of exercising the regal office. The promise of allegiance implies, that the person to whom the promise is made continues king, that is, continues to exercise the power, and afford the protection, which belong to the office of king: for it is the possession of these which makes such a particular person the object of the oath

ALLE'GIANT *a* (from *allege*) Loyal, conformable to the duty of allegiance (*Shaksp*)

ALLEGORICAL ALLEGORICK *a* (from *allegory*) After the manner of an allegory, not real, not literal (*Pope*)

ALLEGORICALLY *ad* (from *allegory*) After an allegorical manner (*Pope*)

To **ALLEGORIZE** *v a* (from *allegory*) To turn into allegory, to form an allegory, to take in a sense not literal (*Locke*)

ALLEGORY, a figure in rhetoric, which consists in choosing a secondary subject having all its properties and circumstances resembling those of the principal subject, and describing the former in such a manner as to represent the latter The principal subject is thus kept out of view, and we are left to discover it by reflection There cannot be a finer or more correct allegory than that in Psal lxxx where a vineyard is made to represent God's own people the Jews

Nothing gives greater pleasure than an allegory, when the representative subject bears a strong analogy, in all its circumstances, to that which is represented But some writers are unlucky in their choice, the analogy being generally so faint and obscure, as rather to puzzle than to please Allegories, as well as metaphors and similies, are unnatural in expressing any severe passion which totally occupies the mind On this account the language which Shakspeare puts into the mouth of Wolsey after his fall, however beautiful, is open to censure

> "This is the state of man to-day he puts forth
> The tender leaves of hope, to-morrow blossoms
> And bears his blushing honours thick upon him
> The third day comes a frost," &c &c

Such an exuberance of allegory and metaphor as we meet with in this speech, never fall from

the lips of a man in deep distress, overwhelmed with grief

ALLEGRANZA, a small island of Africa, and one of the Canaries, lying to the north of Graciosa, to the north-west of Rocca, and to the east of St Clase There are several castles to defend the harbour

ALLEGRI (Gregorio), a celebrated musical composer, was born at Rome He became a singer in the pope's chapel, in 1622 His compositions are still retained in the pontifical chapel The chief is the "Miserere," which is always sung on Good Friday Pope Clement XIV sent a magnificent copy of it to our present king, in 1773 Allegri died in 1672

ALLEGRO, in music, a word used to denote one of the distinctions of time Allegro expresses a sprightly, quick motion, the quickest of all excepting presto The usual distinctions succeed each other in the following order grave, adagio, largo, vivace, allegro, and presto

ALLEIN (Joseph), the son of Tobias Allein, was born at the Devizes in Wiltshire, in 1633, and educated at Oxford In 1655 he became assistant to Mr Newton, in Taunton-Magdalen in Somersetshire, but was deprived for non-conformity He died in 1668, aged thirty-five He was a man of great learning, and greater charity, preserving, though a nonconformist and a severe sufferer on that account, great respect for the church, and loyalty to his sovereign He wrote several books of piety, which are highly esteemed, but his Alarm to unconverted Sinners is more famous than the rest There have been many editions of this little pious work, the sale of which has been very great, of the edition 1672, there were 20,000 sold, of that 1675, with this title, A sure Guide to Heaven, 50 000 There was also a large impression of it with its first title, in 1720, and several of later date

ALLELENGYON, a kind of tributary contribution which the rich in ancient times, paid for the poor when absent in the armies

ALLELUIAH, or HALLELUIAH, a word signifying, Praise the Lord, to be met with either at the beginning or end of some psalms such is Psalm cxlv and those that follow, to the end Alleluiah was sung upon solemn days of rejoicing, Tobit, chap xiii v 12 It was afterwards transferred from the synagogue to the church, and so much energy has been observed in this term, that the ancient church thought proper to preserve it, without translating it either into Greek or Latin, for fear of impairing the genius and softness of it The fourth council of Toledo prohibited the use of it in times of Lent, or other days of fasting, and in the ceremonies of mourning

ALLELUJAH, (from יה הללו *hallelu jah, the Lord be praised*, Heb) Woodsorrel, so called from its many virtues OXALIS, which see

ALLEMANDE, a grave slow kind of music, invented by the Germans, generally composed in the common time of four crotchets in a bar. In Germany and Switzerland they have a dance also of the same name, which is written in common time of two crotchets in a bar

ALLEMANNIC, in a general sense, something relating to the ancient Germans The word is also written Alamannic, Alemannic, and Alemanic It is formed from Alemanni, Allemanni, or Alamanni, the name whereby the German nation was anciently known In this sense we meet with Allemannic history, Allemannic language, Allemannic laws, &c Goldastus, and others, have published collections of writers on Allemannic affairs Allemannicarum rerum scriptores

ALLEN (Thomas), a great mathematician, was born at Uttoxeter, in Staffordshire, in 1542, admitted of Trinity college, Oxford, 1561, and took his degree of M A. in 1567 In 1570, he removed to Gloucester-hall, where he devoted himself chiefly to the study of the mathematics Robert, earl of Leicester, would have procured him a bishopric, but he declined the offer through his love of retirement and study That nobleman placed so much confidence in his abilities, as to consult him on the most important affairs of state He published, in Latin, the second and third books of Ptolemy, "On the Judgment of the Stars," with an exposition He died at Gloucester-hall, Oxford, in 1632, aged 90 years Mr Burton, the author of his funeral oration, calls him "the very soul and sun of all the mathematicians of his age," and Seldon speaks of him, as a person of the most extensive learning and consummate judgment, the ornament of Oxford

ALLER, when used by ancient writers, has a superlative signification So aller good is the greatest good

ALLER, a river of Germany, rises in the duchy of Magdeburg, passes by Luneburg, Zell, &c and joins the Weser, a little below Verden

ALLERION or ALERION, in heraldry, a sort of eagle without beak or feet, having nothing perfect but the wings They differ from martlets by having their wings expanded

ALLESIS, (αλλησις, from αλλος, *another*) In medicine, change from sickness to health, recovery

ALLEVEURE, the smallest copper coin struck in Sweden

To ALLEVIATE *v a* (*allevo*, Lat) To make light, to ease, to soften (*Bentley*)

ALLEVIATION *s* (from *alleviate*) 1 The act of making light (*South*) 2 That by which any pain is eased, or fault extenuated (*Locke*)

ALLEY *s*. (*allée*, Fr) 1 A walk in a garden (*Dryden*) 2 A passage in towns narrower than a street (*Shakspeare*)

ALLEYN (Edward), founder of Dulwich college, in Surrey, was born in 1566. He acquired great reputation as an actor, and became master of a large company, proprietor of a play-house in Moorfields, and keeper of the royal bear-garden, which was worth 500l a year Aubrey says that the devil appeared to him while he was personating the character of

Satan, which so frightened him, that he grew serious, and left off that profession He laid the foundation of his college in 1614, and completed it in 1617, at the expence of 10,000l He then endowed it with 800l per annum, for the maintenance of one master and one warden (who must be unmarried, and always of the name of Alleyn, or Allen), and four fellows, of whom three are to be clergymen, and the fourth an organist, besides six poor men and six women, with twelve poor boys, who are to be educated till the age of fourteen or sixteen, when they are to be apprenticed out to some trade This building is called "The college of God's gift" He was himself the first master He died in 1626, and was buried in the chapel of the college

ALL-FOURS s (from *all* and *four*) A low game at cards, played by two

ALL-GOOD English mercury The vulgar name for the chenopodium bonus Henricus of Linnéus; a plant which may be boiled for spinach, and which is in no degree inferior to it

ALL-HAIL s (from *all* and *hail*, for health.) All health (*Walsh*).

ALL-HALLOW ALL-HALLOWS s (from *all*, and *hallow*) All saints-day

ALL-HALLOWN a (from *all* and *hallow*.) The time about All saints-day (*Shaks*)

ALLHALLOWS, a small island noted for its fishery, at the N W corner of Pomona, one of the Orkneys

ALL-HALLOWTIDE s (See ALL-HALLOWN) The term near All-saint (*Bacon*)

ALL-HEAL, clown's See STACHYS

ALL-HEAL, Hercules's See HERACLEUM and PASTINACA

ALLIA, a small river of Italy, in the territory of the Sabines, to which Virgil annexes the epithet of "infaustum nomen" in allusion to the defeat of the Roman army by the Gauls on the banks of this river, in the year of Rome 363, when 40,000 Romans were either killed or put to flight

ALLIANCE, in the civil and canon law, the relation between two persons, or two families, contracted by marriage

ALLIANCE, is also used to signify a treaty entered into by sovereign princes or states, for their mutual safety or defence

Defensive Alliance, is that whereby the contracting parties engage to stand by and assist each other against any power that shall attack either

Offensive Alliance, implies an agreement between powers, whereby they engage themselves to attack jointly some other prince or state.

ALLIARIA, (*Alliaria, æ, f*, from *allium*, [illegible] smell resembling garlick) Jack of the hedge, Sauce alone, or stinking hedge mustard The plant to which this name is given in the pharmacopœias is the erysimum alliaria, foliis cordatis, of Linnæus; it is sometimes exhibited in humoral asthmas and dyspnœa with success Its virtues are powerfully diaphoretic, diuretic, and antiscorbutic

ALLICA, in entomology, a species of papilio nymphalis

ALLICIENCY s (*allicio*, Latin) The power of attracting any thing (*Glanville*)

ALLIER, a department of France, it is so called from a river which flows by Moulines, and falls into the Loire above Orleans

To ALLIGATE v a (*alligo*, Lat) To tie one thing to another, to unite

ALLIGATI, the basest kind of Roman slaves, who were usually kept fettered

ALLIGATION, a rule in arithmetic, by which are resolved questions which relate to the compounding or mixing together of divers simples or ingredients, being so called from alligare, to tie or connect together, probably from certain vincula, or crooked ligatures, commonly used to connect or bind the numbers together

Alligation is of two kinds, medial and alternate

Alligation medial is the method of finding the rate or quality of the composition, from having given the rates and quantities of the simples or ingredients

Rule multiply each quantity by its rate, and add all the products together then divide the sum of the products by the sum of the quantities, or whole compound, and the quotient will be the rate sought

For example, Suppose it were required to mix together six gallons of wine, worth 5s a gallon, 8 gallons, worth 6s the gallon, and 4 gallons, worth 8s the gallon, and to find the worth or value, per gallon, of the whole mixture

	Gal		s		products
Here	6	mult by	5	gives	30
	8		6		48
	4		8		32
whole comp	18				110 sum of prod.

Then 18)110(6$\frac{2}{18}$, or 6$\frac{1}{9}$s is the rate sought
108

Alligation Alternate is the method of finding the quantities of ingredients or simples, necessary to form a compound of a given rate

Rule 1st Place the given rates of the simples in a column, under each other, noting which rates are less, and which are greater than the proposed compound 2d Connect, or link with a crooked line, each rate which is less than the proposed compound rate, with one or any number of those which are greater than the same, and every greater rate with one or any number of the less ones 3d Take the difference between the given compound rate and that of each simple rate, and set this difference opposite every rate with which that one is linked 4th Then if only one difference stand opposite any rate, it will be the quantity belonging to that rate; but when there are several differences to any one, take their sum for its quantity

For example, Suppose it were required to mix together gold of various degrees of fineness, viz of 19, of 21, and of 23 carats fine,

so that the mixture shall be of 20 caracts fine. Hence,

	Rates	Diffs.	Sum of Diffs
Comp rate 20	21	1	1 of 21 caracts fine,
	19	1+3	4 of 19 caracts fine,
	23	1	1 of 23 caracts fine

That is, there must be an equal quantity of 21 and 23 caracts fine, and 4 times as much of 19 caracts fine

Various limitations, both of the compound and the ingredients, may be conceived, and in such cases, the differences are to be altered proportionally

Questions of this sort are however commonly best and easiest resolved by common algebra, of which they form a species of indeterminate problems, as they admit of many, or an indefinite number of answers

ALLIGATOR A species of the genus Lacerta Its specific character is, head flat, imbricate, nape naked, tail above with two rough lateral lines It inhabits the central parts of America is less than the crocodile, but resembles it in habits and voracity See LACERTA

ALLIGATOR PEAR, in botany See LAURUS

ALLIGATURE s (from *alligate*) The ligature by which two things are joined together

ALLIONIA In botany, a genus of the class and order tetrandria monogynia Common calyx oblong, simple, three-flowered, proper, obsolete, superior, corollets irregular receptacle naked The only known species is a native of South America

ALLIOTH or ALIOTH, an Arabian word, literally denoting a horse it was originally applied to each of the three chief stars in the tail of Ursa Major, but is now confined to the first of these, marked ε by Bayer

ALLISION s (*allido allisum*, Lat) The act of striking one thing against another (*Woodward*)

ALLITERATION, an ornament of which language appears to be capable It is chiefly used in poetry, and consists in the repetition of the same letter at certain intervals It sometimes deforms language, however, instead of adorning it, especially in prose compositions, and on this account, as well as the trivial degree of excellence which attaches to it even when judiciously applied, critics in general disregard it, The poets furnish numerous instances of alliteration, most of them perhaps accidental Dr Johnson cites the following line from Milton, as an instance

"*B*ehemoth *b*iggest *b*orn—"

But Gray's Odes abound with alliterations, almost every strophe commencing and concluding with an alliterative line

"*R*uin seize thee, *r*uthless king "

"To *h*igh-born *H*oel's *h*arp, or soft *L*lewel-lyn's *l*ay "

"*W*eave the *w*arp, and *w*eave the *w*oof "

"Stamp we our vengeance *d*eep, and ratify his *d*oom."

"Regardless of the sweeping whirlwind's sway,

That hush'd in grim *r*epose, expects his ev'ning *p*rey "

From Mr Pope we may also draw an example

"Eternal beauties grace the shining scene,

*F*ields ever *f*resh, and groves for ever green "

And one from Shakspeare

"*H*ad my sweet *H*arry *h*ad but *h*alf their numbers,

This day might I, *h*anging on *H*otspur's neck,

*H*ave talked " Hen IV part ii act 2.

ALL JUDGING, *a* (from *all* and *judge*) That has the sovereign right of judgment (*Rowe*)

ALLIUM Garlic A genus of the class and order hexandria monogynia, thus charactersed Corol six-petalled, spreading, spathe bifid, many-flowered, umbel crowded; stigma simple Fifty species of this plant have been traced through the different parts of Europe, and four or five other species in the West Indies and America Those most common to ourselves are, 1 A sativum Common garlick. 2 A scorodoprasum Rocambole 3. A escalonicum Schallot Eschalotte 4 A. ursinum Ramsons 5 A cepa Onion. 6 A fistulosum Welsh onion Ciboule 7. A schænoprasum Cives or chives. The medicinal uses of garlick are various: it is given as an expectorant in pituitous asthmas. Its utility, as a diuretic, in dropsies, is very considerable It is also esteemed as an anthelmintic, and the decoction of the root is of infinite service in calculous and gravelly complaints The syrup and oxymel of garlick are expunged from our pharmacopœias, as the swallowing of the root in small pieces is considered the best way of administering it

ALL-KNOWING a (from *all* and *know*) Omniscient, all wise (*Atterbury*)

ALLOA, a commercial town on the Frith of Forth, in Clackmannanshire It consists of one spacious street well paved It has a glasshouse, and other manufactures, and has 5214 inhabitants Lat 56 10 N Lon 3 45 W

ALLOBROGES, in ancient geography, the inhabitants of that part of Gallia Narbonensis, which was separated between the rivers Isara to the south and Rhodanus to the north, and the Lacus Lemanus, comprehending a great part of the countries since known by the names of Savoy, Dauphine, and Piedmont Their metropolis was Vienna Cicero (Catilin. iii.) commends the Allobroges for their fidelity; but Horace (Epod xvi) reproaches them on account of their fondness for novelty.

"Novisque rebus infidelis Allobrox."

ALLOCATION, s. (*allocatio*, Lat.) 1. The act of putting one thing to another. 2. The admission of an article in reckoning, an addition of it to the account

ALLOCUTION s. (*allocutio*, Lat.) The act of speaking to another.

ALLODIARIUS, the owner of an allodium.

ALLODIUM, or, ALLEUD, denotes lands which are the absolute property of their owner, without being obliged to pay any service or acknowledgment whatever to a superior lord See FEE, and FEODAL System

ALLOGIA, in antiquity, denote winter quarters appointed for the soldiery

ALLONGE s. (*allonge*, Fr) 1 A pass, or thrust with a rapier 2 A long rein in which a horse is exercised

To ALLOO *v a* To set on, to incite a dog by crying alloo

ALLOQUY *s* (*alloquium*, Lat) The act of speaking to another, address, conversation

To ALLOT *v a* (from *lot*) 1 To distribute by lot 2. To grant (*Dryden*) 3 To distribute, to give each his share (*Tat*)

ALLOTMENT *s* (from *allot*) The part, the share, the portion granted (*Rogers*)

ALLOTRIOPHAGIA, (allotriophagia, æ, f, ἀλλοτριοφαγία, from ἀλλότριος, foreign, and φαγω, to eat) A synonym of pica (See PICA) In Vogel's nosology it signifies the greedily eating unusual things for food

ALLOTTERY *s* (from *allot*) That which is granted to any particular person in a distribution (*Shakspeare*)

To ALLOW *v a* (*allouer*, Fr) 1 To admit, not to contradict (*Locke*) 2 To justify, to maintain as right (*Shakspeare*) 3. To grant, to yield (*Locke*) 4 To permit (*Shakspeare*) 5 To authorize (*Shakspeare*) 6. To give to, to pay to (*Waller*) 7 To make abatement, or provision (*Addison*)

ALLOWABLE *a* (from *allow*) 1 That may be admitted without contradiction (*Brown*) 2. Lawful, not forbidden (*Atterbury*)

ALLOWABLENESS *s* (from *allowable*) The quality of being allowable, lawfulness, exemption from prohibition (*South*)

ALLOWANCE *s* (from *allow*) 1 Admission without contradiction (*Locke*) 2 Sanction, licence (*Hooker*) 3 Permission (*Locke*) 4 A settled rate for any use (*Bacon*) 5 Abatement from the strict rigour of a law, or demand (*Swift*) 6 Established character (*Shakspeare*)

ALLOY, or ALLAY, in the business of coining, &c a proportion of a baser metal mingled with a finer or purer Minters never strike any gold or silver coin without alloy, always mixing some copper with those two metals, according to a certain proportion Brass coin is made of an alloy of copper, mixed with a few parts of fine silver Jewellers, gold and silver smiths, are obliged to use alloy in the gold and silver they work The standard of gold coin is twenty-two carats of fine gold, and two [illegible] troy the standard for silver is [illegible] two pennyweights [illegible] of silver, and eighteen pennyweights of alloy of copper. The chief [illegible] for the alloying of coin are, 1. The [illegible] of the metals, which when smelted from the mine are not perfectly pure. 2. The saving the expence it must otherwise cost if they were to be refined 3 The necessity of rendering them harder, by mixing some parts of other metals with them, to prevent the diminution of weight by wearing, in passing from hand to hand 4 The melting of foreign gold or coin which is alloyed 5 The charges of coinage, which must be made good by the profit arising from the money coined 6 and lastly, The duty belonging to the sovereign, on account of the power he has to cause money to be coined in his dominions

ALLOY, in chemistry, is used in a more general sense to denote the union of different metallic matters, by which their density, specific gravity and other properties are changed; or a combination of any two or more metals into one homogeneous mass, in distinction from mere mechanical mixtures, which, however, are sometimes not easily known from genuine alloys

As all metals, except mercury, are naturally in a solid state under the common temperature, the first thing necessary for their union is that at least one of them be melted, they then unite, like all bodies which reciprocally dissolve each other, and form compounds which have the mixt properties of the component substances In these metallic alloys, however, phenomena are frequently observed which depart from the general rules of combinations, these are occasioned by the nature of the process, which is [illegible]ally favourable to intimate mixture as to chemical combination, and therefore it is no wonder that these two circumstances are often confounded with each other

To distinguish these various methods have been devised, such as fusing the mass with as little heat as possible, and keeping it in this state till its component parts separate from each other by their specific gravities,—comparing the properties of the compound with those of its elements,—remarking the change which takes place in ductility, colour, and fusibility, an increase of which usually indicates a chemical union,—but these methods are often too inaccurate, and liable to too many exceptions, to be absolutely depended upon, or universally adopted It is to be lamented that the subject of alloys has received less notice than any other branch of chemical enquiry, and much less than its importance deserves "Many peculiar difficulties attend the investigation of the general principles according to which metals act on each other, and the general phenomena necessarily attending such action, it is a subject that may demand the abilities, and will recompense the attention, of the greatest and most accurate philosopher" To the incentive, furnished by this passage from Rees's Cyclopedia, we beg leave to add our wishes that the exertions of the most able chemists may be directed to a pursuit so necessary and so useful.

Several of the alloys are of great use in the arts, as brass, which is composed of copper and zinc, bell-metal, or bronze, composed of

copper and tin, pewter, of tin, lead, and antimony, soft solder, of bismuth and tin, specula, for reflecting telescopes, of copper, tin, and arsenic, Pinchbeck, prince's metal, &c which see under their respective names The alloys in general will be treated of at the same time with the different metals of which they are composed, or with which they are found native Combinations of the metals with mercury are called amalgams, for an account of which, see AMALGAM

ALL-POWERFUL *a* (from *all* and *powerful*) Almighty, omnipotent (*Swift*)

ALL SAINTS-DAY *s* The day on which there is a general celebration of the saints, the first of November See ALL-SAINTS

ALL-SEED See LINUM

ALL-SEEING *a* (from *all* and *see*) That beholds every thing (*Dryden*)

ALL SPICE See MYRTUS and PIMENTO

ALL SUFFICIENT *a* (from *all* and *sufficient*) Sufficient to every thing (*Norris*)

To ALLU'DE *v n* (*alludo*, Lat) To have some reference to a thing, without the direct mention of it, to hint at (*Burnet*)

ALLUM See ALUM

ALLUMINOR *s* (*allumer*, Fr to light) One who colours or paints upon paper or parchment (*Cowell*)

To ALLURE *v a* (*leurer*, Fr) To entice to any thing (*Milton*)

ALLURE *s* (from the verb) Something set up to entice other things to it (*Hayward*)

ALLUREMENT *s* (from *allure*) Enticement, temptation of pleasure (*Dryden*)

ALLU'RER *s* (from *allure*) Enticer, inveigler

ALLU'RINGLY *ad* (from *allure*) In an alluring manner, enticingly

ALLURINGNESS *s* (from *alluring*) Enticement, temptation by proposing pleasure

ALLUSION *s* (*allusio*, Lat) A hint, an implication (*Burnet*)

ALLUSION, ALLUSIO, in rhetoric, a figure whereby something is applied to, or understood of another, by reason of some similitude of name, or sound The word is formed of ad, and ludere, *to play*

ALLU'SIVE *a* (*alludo*, *allusum*, Latin) Hinting at something (*Rogers*)

ALLU'SIVELY *ad* (from *allusive*) In an allusive manner by implication (*Hammond*)

ALLU'SIVENESS *s* (from *allusive*) The quality of being allusive

ALLUVIAL LIMESTONE, a sort of stone found in many districts, supposed to have been formed in the earliest ages of the world by the deposition of calcareous matters held in the state of solution in water

ALLU'VION *s* (*alluvio*, Lat) 1 The carrying of any thing to something else by the motion of water 2 The thing carried by water to something else (*Cowell*) 3 The gradual increase of land along the sea shores, or on the banks of rivers The civil law places alluvion among the lawful means of acquisition; and defines it to be a latent, imperceptible accretion —Hence, when any considerable portion of ground is torn away at once, by an inundation, and joined to some neighbouring estate, this is not acquired by right of alluvion, but may be claimed again by the former owner

ALL-WISE *a* (from *all* and *wise*) Possest of infinite wisdom (*Prior*)

To ALLY *v a* (*allier*, Fr) 1 To unite by kindred, friendship, or confederacy (*Pope*). 2 To make a relation between two things, by similitude, or any other means (*Dryden*)

ALLY *s* (*allie*, Fr) One united by some means of connexion (*Temple*)

ALMAAC, or ALMACH, a star of the second magnitude, marked γ in Andromeda's left foot

ALMADIE, a kind of African canoe, or small vessel, about four fathoms long, commonly made of bark

ALMADIE, is also the name of a kind of long-boats, fitted out at Calicut, which are eighty feet in length, and six or seven in breadth

ALMAGEST, the name of a celebrated book, composed by Ptolemy, being a collection of many of the observations and problems of the ancients, relating both to geometry and astronomy In the original Greek it was called συνταξις μεγιςη, q d greatest construction, or collection, which last word megiste, joined to the particle al, gave occasion to its being called almagest by the Arabians, who translated it into their tongue about the year 800, by order of the caliph Al Mamon —The Arabic word is almaghesti Ptolemy was born about the year of Christ 69, and died in 147, and wrote this work, consisting of 13 books, at Alexandria in Egypt, where the Arabians found it on the capture of that kingdom It was by them translated out of Greek, into Arabic, by order of the caliph Almamon, about the year 827, and first into Latin about 1230, by favour of the emperor Frederic II The Greek text however was not known in Europe till about the beginning of the 15th century, when it was brought from Constantinople, then taken by the Turks, by George, a monk of Trabezond, who translated it into Latin, which translation has several times been published Riccioli, an Italian jesuit, also published, in 1651, a body of astronomy, which, in imitation of Ptolemy, he called Almagestum Novum, the New Almagest, being a large collection of ancient and modern observations and discoveries, in the science of astronomy

ALMAGRA, a fine deep red ochre, with some admixture of purple, very heavy, and of a dense yet friable structure, and rough dusty surface It adheres very firmly to the tongue, melts freely and easily in the mouth, is of an austere and strongly astringent taste, and stains the skin in touching. It is the Sil Atticum of the ancients It ferments very violently with acids, which sufficiently distinguishes it from the Sil Syricum, to which it has in many

respects a great affinity There are immense quantities of it in many parts of Spain It is used in painting, and in medicine as an astringent

ALMAMON, or ABDALLAH, caliph of Bagdad, was the son of Haroun al Raschid, and born about 785 On the death of his brother, Al Amin, in 813, he obtained the sovereignty, which he adorned by his virtues and good conduct. He was fond of learning, and encouraged learned men He founded an academy at Bagdad, and invited thither able professors to teach the languages and sciences He calculated himself a set of astronomical tables, and caused the works of the most celebrated ancient authors to be translated into Arabic He died in 833

ALMANACK, a book or table, containing a calendar of days and months, the rising and setting of the sun, the age of the moon, the eclipses of both luminaries, &c Authors are divided with regard to the etymology of the word, some deriving it from the Arabic particle al, and manach, to count, some from almanah, new year's gifts, because the Arabian astrologers used at the beginning of the year to make presents of their ephemerides, and others, from the Teutonic almaenachte, observations on all the months Some derive it from the Arabic particle al, and the Greek μην, a month, or μηνιακος, the course of the months but the most simple etymology appears from the common spelling, the word being composed of two Arabic ones, Al Manack, which signify the Diary Regiomontanus appears to have been the first in Europe who reduced almanacks into their present form and method, gave the characters of each year and month, foretold the eclipses and other phases, calculated the motions of the planets, &c His almanack was first published in 1474

Almost ever since almanacks have been known, astrological and other predictions have been considered, if not as an essential part, at least, as a very useful auxiliary this continues to be the case to the present day, with some almanacks, notwithstanding that most people pretend to disbelieve such predictions It is a curious fact that in the year 1800, about 400,000 copies were sold of Moore's Almanack, while other much more useful and instructive almanacks, as the Lady's and Gentleman's Diaries, were confined in their circulation to a few thousands

The almanack, annexed to the book of Common Prayer, is part of the law of England, of which the courts must take notice in the returns of writs, &c For ascertaining many circumstances relative to a particular day past, the court hath determined by an inspection of the almanack. Upon a writ of error from an inferior court, the error assigned was, that the [illegible] a Sunday, the day [illegible] it appearing, by [illegible] of that year, that the [illegible] of Feb[illegible] fell upon a Sunday, [illegible] trial, and that a trial by jury was not necessary, although it was an error in fact, and so the judgment was reversed But in all these cases, the judges, if they conceive a doubt, may order it to be tried by a jury Blackst Com vol iii p 333

Nautical Almanack, and *Astronomical Ephemeris*, a kind of national almanack, published by anticipation for several years beforehand, for the convenience of ships going out upon long voyages it is adapted to the first meridian, and contains, besides many particulars common to other almanacks, the sun's longitude, right ascension, declination, the planets' longitudes, latitudes, times of passing the meridian, the times of solar and lunar eclipses, together with those of Jupiter's satellites, the distances of the moon from the sun, and certain fixed stars, and, in general, the times when any remarkable celestial appearances may be seen at the place for which the ephemeris is calculated This ephemeris was proposed by Dr Maskelyne to be calculated for the meridian of Greenwich, and the scheme being adopted by the commissioners of longitude, the first Nautical Almanack was published in 1767, and they have been regularly published ever since, and are continued as far as the year 1812 Dr Maskelyne has also published Requisite Tables to be used with the Nautical Ephemeris, which, together with the Ephemeris, are indispensably necessary in most of the methods of finding the longitude now used, and will, even if the doctor had done nothing else for the promotion of astronomy and navigation, ever reflect upon him the highest honour, and most lasting celebrity

It must be confessed, however, that with the exception of the Nautical Almanack, White's Ephemeris, and two or three others, the almanacks published in this country are very inferior in point of utility to what might naturally be expected, considering the state of human knowledge amongst us Instead, for example, of publishing county almanacks upon a single sheet, it would be far more useful to make them occupy a volume Three or four contiguous counties might constitute a department and then, besides the most interesting astronomical particulars peculiar to an almanack, the following subjects might be treated 1 There might be a succinct geographical description of the earth, and of its principal divisions, enlarging most upon Great Britain, and the department for which the almanack was intended 2 A brief view of the constitution and government of England in church and state, with the names of the principal officers in both 3 A sketch of the state of agriculture, manufactures, and commerce in England, and a more minute account of their state and annual progress, in the particular department 4 The state of the animal, vegetable, and mineral productions, in the department 5 A table of its population, the births, marriages, and deaths, usual term of human life; instances of peculiar lon-

gevity, number of men capable of bearing arms, &c. 6. Examples of humanity, courage, public spirit, &c. in the department. 7. State of religion, and of public instruction. 8. Tables of meteorological observations, during the preceding year. These, and other subjects, which do not immediately occur to our minds, would furnish scope for an interesting variety, yearly, and the comparison of the almanacks of the different departments, would have a strong tendency to diffuse more widely the benefits resulting from agricultural, commercial, literary, and moral, improvement.

ALMANACK, among antiquaries, a kind of instrument usually of wood, inscribed with various figures and Runic characters, and representing the order of the feasts, days of the week, and other matters necessary to be known throughout the year. Almanacks of this kind were used by the ancient northern nations, and are known by various names, as rimstocks, primstaves, ... ills, baculi annales, &c.

ALMARIA, in ancient records, the archives of a church, or the like.

ALME, or ALMA, singing and dancing girls in Egypt, who, like the Italian improvisatori, can occasionally pour forth "unpremeditated verse." They are called Alme, from having received a better education than other women. They form a celebrated society in that country. To be received into it, according to Mr. Savary, it is necessary to have a good voice, to understand the language well, to know the rules of poetry, and be able to compose and sing couplets on the spot, adapted to the circumstances of the occasion. The common people have also their Alme. They are girls of the second class, who try to imitate the former, but they have neither their elegance, their graces, nor their knowledge.

ALMEIDA, a frontier town of Beira, in Portugal, containing about 2200 inhabitants. Lat. 40. 38 N. Long. 8. 15 W.

ALMEIDA, a frontier town of Portugal, on the confines of Leon. The Spaniards besieged and took it in 1762. Lat. 40. 45 N. Long. 6. 15 W.

ALMEISAR, a celebrated game among the ancient Arabs, performed by a kind of casting of lots, with arrows, strictly forbid by the law of Mahomet, on account of the frequent quarrels occasioned by it.

The manner of the game was thus: a young camel being brought and killed, was divided into a number of parts. The adventurers, to the number of seven, being met, eleven arrows were provided without heads or feathers, seven of which were marked, the first with one notch, the second with two, the third with three, &c. the other four had no marks. These arrows were put promiscuously into a bag, and thus drawn by an indifferent person. Those to whom the marked arrows fell, won shares in proportion to their lot, the rest to whom the blanks fell, were intitled to no part of the camel, but obliged to pay the whole price of it. Even the winners tasted not of the flesh themselves, more than the losers; but the whole was distributed to the poor.

ALMENE, in commerce, a weight of two pounds, used to weigh saffron in several parts of the continent of the East Indies.

ALMERICANS, were the followers of Almeric, or Amauri, in the thirteenth century. They maintained that the power of the Father continued no longer than the Mosaic dispensation; that the empire of the Son extended only to the thirteenth century; and that then the reign of the Holy Ghost commenced, when all sacraments and external worship were to be abolished, and the salvation of Christians was to be accomplished merely by internal acts of illuminating grace. Their morals were as infamous as their doctrine was absurd.

ALMIGGIM WOOD (Scripture), is thought to be that of the Indian pine-tree; which being light and white, was greatly esteemed for making musical instruments.

ALMIGHTINESS. s. (from *almighty*.) Unlimited power, omnipotence, one of the attributes of God (*Taylor*).

ALMIGHTY. a. (from *all* and *mighty*.) Of unlimited power, omnipotent (*Genesis*).

ALMO, in ancient geography, a river of Latium, which, rising near Bovillæ, took a northern direction, and discharged itself into the Tiber to the south west of Rome.

ALMOGIZA, the circumference of the astrolabe.

ALMOHARRAM, the first month of the Arab year.

ALMOND, bitter, common, and sweet. See AMYGDALA.

ALMOND, African, and Ethiopian. See BRABEJUM.

ALMOND, or ALMAN-FURNACE, is a peculiar kind of furnace, used in refining, to separate all kinds of metals from cinders, parts of melting-pots, tests, bricks, &c. It is the common melting furnace of the German refiners. See FURNACE.

ALMOND-STONES. See AMYGDALITES.

ALMONDBURY, a village in the West Riding of Yorkshire, formerly a Roman town called Campodonum.

ALMONDS OF THE EARS. The tonsils so called in common language from their situation and resemblance. See TONSILS.

ALMONDS OF THE THROAT. The same as ALMONDS OF THE EARS. See TONSILS.

ALMONER, in its primitive sense, denotes an officer in religious houses, to whom belonged the management and distribution of the alms of the house. By the ancient canons, all monasteries were to spend at least a tenth part of their income in alms to the poor. The almoner of St. Paul's is to dispose of the monies left for charity, according to the appointment of the donors, to bury the poor who die in the neighbourhood, and to breed up eight boys to singing, for the use of the choir. By an ancient canon, all bishops are required to keep almoners.

LORD ALMONER, or LORD HIGH AL-

MONER, OF ENGLAND, is an ecclesiastical officer, generally a bishop, who has the forfeiture of all deodands, and the goods of felos de se, which he is to distribute among the poor He has also, by virtue of an ancient custom, the power of giving the first dish from the king's table to whatever poor person he pleases, or, instead of it, an alms in money

ALMONRY, or AUMBRY, the office or lodgings of the almoner, also the place where alms were distributed

ALMOST *ad* (from *all* and *most*) Nearly, well nigh (*Bentley*)

ALMS, *eleemosyna*, a general term for what is given out of charity to the poor Anciently, the ecclesiastics subsisted wholly on alms, which were thus divided one part was allotted to the bishop, another to the priests, and a third to the deacons and subdeacons, which made their whole subsistance, the fourth part was employed in relieving the poor, and in repairing the churches

A'LMSBASKET *s* (from *alms* and *basket*) The basket in which provisions are put to be given away (*L'Estrange*)

A'LMSDEED *s* (from *alms* and *deed*) An act of charity, a charitable gift (*Shaksp*)

A'LMSGIVER *s* (from *alms* and *giver*) He that supports others by his charity (*Bacon*)

ALMSHOUSE *s* (from *alms* and *house*) A hospital for the poor (*Pope*)

ALMSMAN *s* (from *alms* and *man*) A man who lives upon alms (*Shakespeare*).

ALMUCANTARS, in astronomy, circles parallel to the horizon, imagined to pass through all the degrees of the meridian The word is Arabic The modern astronomers more commonly use the term parallels of altitude

ALMUCANTAR'S-STAFF, an instrument having an arch of 15°, used to take observations of the sun about the time of its rising and setting, in order to find the amplitude

ALMUCIUM, a cover for the head, worn formerly by monks: it was somewhat like the square caps now worn in universities

ALMUGEA, in astrology, a certain configuration of the five planets, in respect of the sun and moon, correspondent to that which is between the hours of those planets, and the sun's and moon's hours

ALMUGIM, or ALMUG-TREE, a certain kind of wood mentioned in the first book of Kings, ch x ver 11. and 2d Chron ch ii ver 8. It was imported by Solomon from Ophir, and used in the making of rails, or pillars of the temple It is thought to be the same with the shittim-wood, of which such frequent mention is made by Moses

ALMUREDIN, the Arabic name of the star [illegible] in Virgo.

[illegible]UTHEN, or ALMUSTEULI, in astro[illegible] which surpasses the rest in the [illegible]

AL[illegible] by the ell, a [illegible] formerly was to [illegible]

[illegible] Ell-

measure, or rather the measuring by the ell or yard

ALNEWICK, or ALNWICK, the county town of Northumberland, with a market on Saturday It is a populous and well-built town, with three gates, seated on the river Alne, thirty miles N of Newcastle Lat 55 25 N Long 1 30 W

ALNIFOLIA See CLETHRA

ALNI-FRUCTU See CONOCARPUS, and THEOBROMA

A'LNIGHT *s* A great cake of wax, with the wick in the midst (*Bacon*)

ALNUS (אלן, *alun*, Heb) The birch, or alder-tree The juice of the fresh leaves of this plant, betula, alnus pedunculis ramosis of Linnéus, are employed to discuss the indurated lacteal glands of inflamed breasts in wet nurses See BETULA

ALOA, in Grecian antiquity, a festival kept by husbandmen in honour of Ceres it greatly resembled our harvest-home.

A'LOE In botany, a genus of the class and order hexandria monogynia Corol erect, inferior, with an expanded mouth and nectariferous base, calyxless, filaments inserted into the receptacle Its species are seventeen, found in different parts of the southern climates of Europe, in Asia, Africa, and America, but chiefly at the Cape, which only differ in their respective degrees of purity, the first being the best* The following is the manner of obtaining them deep incisions are made in the plant, which gradually distil a juice, which being poured off from its feculence, is inspissated in the heat of the sun, and in that state put into leathern bags under the name of socotrine aloes. The juice obtained from the leaves by a slight pressure, after being in like manner purified and inspissated, is that denominated hepatic aloes, or from its more common origin, aloe barbadensis. The same leaves by a stronger pressure afford other juice, which mixed with the dregs of the two foregoing, constitutes the caballine aloes The first kind contains more gum but less resin than the two last, and on this account is a milder and less drastic purge The aloe constitutes an ingredient in various preparations in most modern pharmacopœias, under the various forms of wines, tinctures, pills, and powders

ALOE, AMERICAN See AGAVE

ALOE, WATER. See STRATIOTES.

ALOES LIGNUM See LIGNUM ALOES

ALOETICAL *a.* (from *aloes.*) Consisting chiefly of aloes (*Wiseman*)

* Of these, the only two worth noticing are a. dichotoma with forked stem, ensiform leaves, and panicled flowers, frequently employed as an excellent hedge-fence; and a. perfoliata, caulescent, with ensiform toothed, erect leaves, and racemed, reflected, cylindrical flowers, indigenous to India, Africa, and Italy From this plant we obtain the three kinds of medical aloes, sold under the names of *socotrine*, or aloes of Socotra, where it is chiefly [illegible]ufactured; *hepatic*, or liver-coloured; and ca[illegible] or horse-aloes.

ALOFT *ad* (*lofter*, to lift up, Dan.) On high, above, in the air (*Suckling*)

ALOFT *prep* Above (*Milton*)

ALOGIANS, in church-history, a sect of ancient heretics, who appeared about the close of the second century They denied that Jesus Christ was the Logos, and consequently rejected the gospel of St John The word is compounded of the privative α, and λογος, q d *without Logos* or *Word*

ALOGOTROPHIA (αλογοτροφια, from αλογο, *unequal*, and τρεφω, *to nourish*) Partial or disproportionate nourishment, as in the rickets.

A'LOGY *s* (αλογια) Unreasonableness, absurdity

ALOI'DES (αλοειδης, from αλοη, *the aloe*, and ειδος, *a likeness*) The water-aloe

ALO'NE. *a.* (*alleen*, Dutch.) 1 Without another; single (*Bentley*) 2. Without company; solitary (*Sidney*).

ALONG *ad.* (*au longue*, Fr.) 1 At length (*Dryden*). 2. Through any space measured lengthwise (*Bacon*). 3. (from *allons*, Fr) Forward; onward (*Pope*).

ALO'NGST. *ad.* Through the length (*Knolles*)

ALOOF *ad.* (*all off*, that is, *quite off*) At a distance, at a small distance (*Dryden*).

ALOPECES (αλωπεκες, from αλωπηξ, *a fox*.) The PSOÆ MUSCLES (which see), so named by Fallopius and Vesalius, because in a fox they are peculiarly strong.

ALOPECIA (αλωπεκια, from αλωπηξ, *the fox*.) Baldness a morbid loss of hair. A disease enumerated in the nosology of Sauvages.

ALOPECUROS See BETONICA

ALOPECU'RUS Fox-tail grass A genus of the class and order triandria digynia Calyx two-valved, one-flowered, corol one-valved. It embraces six species, four of which are inhabitants of the marshes, and oozy meadows of our own country. The other two are natives of India

A'LOS (αλς, from αλς) Salt

ALOSA. (αλωσα, from αλισκω, *to seize*, as being a predatory fish). The shad: whose flesh was formerly much esteemed by medical practitioners as a restorative.

ALOUD. *ad* (from *a* and *loud*.) Loudly; with a great noise (*Waller*).

ALOW. *ad.* (from *a* and *low*.) In a low place, not aloft (*Dryden*).

ALPAGE, is sometimes used to denote the privilege of feeding cattle on the Alps

ALPAM, in botany. See A[illegible].

ALPHA, a river in the vicinity of Aquileia, near which Constantine was killed, and into which his body was thrown.

ALPHA, the name of the first letter of the Greek alphabet, answering to our A. As a numeral, it stands for one, or the first of any thing. It is particularly used among ancient writers to denote the chief man of a class or rank.

ALPHABET, the natural or customary series of the several letters of a language. The word is formed from alpha and beta, the first and second letters of the Greek alphabet The number of letters is different in the alphabets of different languages The English alphabet contains 24 letters, to which if we add j and v consonant, the sum will be 26 the French contains 23, the Hebrew, Chaldee, Syriac, and Samaritan, 22 each, the Arabic 28, the Persian 31, the Turkish 33, the Georgian 36, the Coptic 32, the Muscovite 43, the Greek 24, the Latin 22; the Sclavonic 27, the Dutch 26, the Spanish 27; the Italian 20; the Shanscrit 50, the Ethiopic and Tartarian, each 202, the Indians of Bengal 21, the Baramese 19 The Chinese have, properly speaking, no alphabet, except we call their whole language by that name, their letters are words, or rather hieroglyphics, amounting to about 80,000

It has been a matter of considerable dispute whether the method of expressing our ideas by visible symbols called letters, be really a human invention, or whether we ought to attribute an art so exceedingly useful, to an immediate revelation from the Deity. It would lead us, however, into too wide a field to discuss this subject, and to state the arguments that have been used on both sides; neither is it immediately necessary to our purpose, although we are most inclined to the latter opinion.

By the learned author of Hermes we are taught that it is to about 20 plain elementary sounds we owe that variety of articulate voices which have been sufficient to explain the sentiments of such an innumerable multitude as all the past and present generations of men. Mr. Sheridan says, that the number of simple sounds in our tongue is 28; while Dr. Kenrick says, that we have only 11 distinct species of articulate sounds, which even by contraction, prolongation, and composition, are increased only to the number of 16; every syllable or articulate sound in our language being one of the number. Bishop Wilkins speaks of 33 distinct sounds.

After the decomposition of language into its elementary sounds, the next step towards the notation of it by alphabetical characters, would be the delineation of a separate mark or letter to represent each sound, which marks, though few in number, would admit of such a variety of arrangements [illegible] as might be capable of [illegible] infinity of articulate sounds [illegible] language The ingenious W[illegible] to show, that ten characters [illegible] for this purpose; and if this [illegible] then the most simple alphabet, which [illegible] ing to his scheme, consisting of 10 [illegible] must have been amply sufficient to answer all the purposes of mankind, and much of our twenty-[illegible] alphabet may appear superfluous [illegible] however, [illegible] and much [illegible] sufficient to express all the sounds [illegible] articulated by man As there

are more sounds in some languages than in others, it follows of course, that the number of elementary characters, or letters, must vary in the alphabets of different languages The numbers of several are stated at the beginning of this article We cannot here enter the discussion of the powers, shapes, deficiences, &c of the various alphabets, but must content ourselves with laying down the scheme of the English alphabet, as given by Mr Sheridan in his Rhetorical Grammar

The number of simple sounds in our tongue is 28

9 *Vowels*,

3	1	2	3	2	3	1	1	1
a	a	a	e	o	o	e	i	u
hall	hat	hate	beer	note	noose	bet	fit	but

w — short oo   y — short ee

19 *Consonants*,

eb ed ef eg ek el em en ep er es et
ev ez eth eth esh ezh ing.

2 *Superfluous*,

c, which has the power of *ek* or *ess*;
q, that of *ek* before *u*

2 *Compound*,

j, which stands for *edzh*,
x, for *ks*, or *gz*.

1 *No letter*,

h, merely a mark of aspiration

Consonants divided into Mutes and Semivowels.

6 *Mutes*,

eb ed eg ek ep et

3 *Pure Mutes*,

ek ep et

3 *Impure*,

eb ed eg

13 *Semivowels, or liquids*,

ef el em en er ess ev ez eth eth esh ezh ing.

9 *Vocal*,

el em en er ev ez eth ezh ing.

4 *Aspirated*,

ef ess eth esh

Divided again into

4 *Labial*,

eb ep ev ef

8 *Dental*,

ed et eth eth ez es ezh esh

4 *Palatine*,

eg ek el er.

3 *Nasal*,

em en ing.

The same writer observes, that our alphabet is [illegible] for the notation of the English tongue, as there are many sounds for which we have no [illegible] marks; and there ought to be nine more characters or letters to make a [illegible] alphabet, in which every simple [illegible] have a mark peculiar to itself [illegible] that the Roman [illegible] for the notation [illegible] by no means [illegible]

A [illegible] kind of [illegible] natural order, each having [illegible] or more [illegible], in which are [illegible] names of those who have open accounts, referring to the folios of the ledger where they are to be found

ALPHABETICAL *a* (from *alphabet*) According to the series of letters (*Swift*)

ALPHABETICALLY *ad* In an alphabetical manner (*Holder*)

ALPHERATER, a fixed star of the third magnitude in Aquarius

ALPHEUS, in ancient geography, one of the names of Pisa, in Etruria

ALPHEUS, a river of Elis, whose source was in the interior part of Peloponnesus, in the south-east coast of Arcadia The Olympic games were celebrated on the banks of this river, and Orpheus was worshipped as a god at Olympia Thus Pindar

"Alpheus, thy immortal flood,
On his lord's triumphant brows
Th' Olympic wreath bestow'd."
Ode i. West's Pindar, vol. i. p 7

ALPHONSIN, in surgery, an instrument for extracting bullets out of gun-shot wounds

This instrument derives its name from the inventor, Alphonsus Ferrier, a physician of Naples It consists of three branches, which are closed by a ring. When closed and introduced into the wound, the operator draws back the ring towards the handle, upon which the branches opening take hold of the ball, and then the ring is pushed from the haft, by which means the branches grasp the ball so firmly as to extract the ball from the wound See WOUNDS, and SURGERY.

ALPHONSO, in biography, the name of several kings of Portugal

ALPHONSUS X, king of Leon and Castile, who has been surnamed the Wise, on account of his attachment to literature, and is now more celebrated for having been an astronomer than a king He was born in 1203, succeeded his father Ferdinand III in 1252, and died in 1284, at the age of 81

This prince understood astronomy, philosophy, and history, as if he had been only a man of letters, and composed books upon the motions of the heavens, and on the history of Spain, which are highly commended "What can be more surprising," says Mariana, "than that a prince, educated in a camp, and handling arms from his childhood, should have such a knowledge of the stars, of philosophy, and the transactions of the world, as men of leisure can scarcely acquire in their retirements? There are extant some books of Alphonsus on the motions of the stars, and the history of Spain, written with great skill and incredible care" In his astronomical pursuits he discovered that the tables of Ptolemy were full of errors; and thence he conceived, first of any, the resolution of correcting them. For this purpose, about the year 1240, and during the life of his father, he assembled at Toledo the most skilful astronomers of his time, Christians, Moors, or Jews, when a plan was formed for constructing new tables. This task was accomplished about 1252, the first year of his reign; the tables being drawn up chiefly by the skill and pains

of rabbi Isaac Hazan, a learned Jew, and the work called the Alphonsine Tables, in honour of the prince, who was at vast expences concerning them He fixed the epoch of the tables to the 30th of May 1202, being the day of his accession to the throne They were printed for the first time in 1483, at Venice, by Radtolt, who excelled in printing at that time, an edition extremely rare there are others of 1492, 1521, 1545, &c

Alphonsus has been accused of blasphemy and impiety for having said, "that if God had asked his advice when he made the world, he would have given him better council" If he really made use of this language, it must have been meant only with an allusion to the absurdities of the Ptolemaic system, which, as an astronomer, he could not but condemn Still however, after making every allowance, this language is so highly irreverent as to demand censure, if indeed we could give credit to the story · but it rests chiefly on a vulgar tradition, and as it is incompatible with the character of Alphonsus, who is said to have read the Bible fourteen times, we think it better to deny its probability, than to lay much stress upon any apology for it

A'LPHUS (ἀλφός, *white*) Vitiligo alba. Morphæa alba Lepra maculosa alba. A species of leprosy with white spots, as those of the elephantiasis are black It is produced by a peculiar miasma local to Arabia and the neighbouring countries.

ALPI'NIA In botany, a genus of the class and order monandria monogynia Calyx three-toothed, equal, tubular, corol three parted, equal, nectary two-lipped, the lower lip expanding It affords four species, which are natives of the East or West Indies

ALPS, a range of high mountains, separating Italy from Gaul and Germany, in the form of a crescent They take their rise from the Vada Sabatia, or Savona, and reach to the Sinus Flanaticus (now Golfo di Carnaro of the Adriatic), and the springs of the river Colapis (now the Kulpe); extending, according to Livy, 2000 stadia in length, or 250 miles they are divided into several parts, and accordingly have different names From Savona to the springs of the Varus, where the Alps lie against the Sea of Genoa, they are called Maritime, now le Montagne di Tenda. These extend from south to north, between Gaul to the west and Genoa to the east, beginning at Monaco on the Mediterranean; then running out through the east of the county of Nice, and between that and the marquisate of Saluzzo, terminate at length at mount Viso, between Dauphiné and Piedmont.

The Alps are the highest mountains in Europe; being, according to some geometricians, about two miles in perpendicular height. They begin at the Mediterranean, and, stretching northward, separate Piedmont and Savoy from the adjacent countries; whence directing their course to the east, they form the boundary between Switzerland and Italy, and terminate near the extremity of the Adriatic Sea, north-east of Venice. It was over the western part of those mountains, towards Piedmont, that Hannibal forced his passage into Italy

ALPS, LOWER, DEPARTMENT OF, is one of the four departments composed out of the ci-devant Provence in France Its chief town is Digne, its superficies about 1,459,700 acres, and its population about 144,440 individuals

ALPS, UPPER, DEPARTMENT OF, makes a part of Dauphiné, which contains three Its chief town is Gap; its superficies about 1,084,620 acres, and its population 116,750 persons

ALPS, MARITIME, DEPARTMENT OF, is formed of the county of Nice Its chief town is Nice; its superficies about 632,620 acres; and its population 92,370 individuals.

ALPUJARAS, or ALPUXARRAS, a famous ridge of high mountains of Granada, in Spain These mountains are inhabited by Moors who have received the Roman catholic religion, but retain their old way of living Their language is a mixture of the Arabic and Spanish.

ALQUIFOU, ALQUIFOUX, or ARQUIFOU, is a sort of mineral lead, ore of lead, or galena. It is very heavy, easily reduced into powder, and hard to melt. In England it is called potter's ore, because the potters use it as a green varnish, when mixed with manganese, it is used to glaze their wares of a blackish colour

ALRAMECH, the Arabic name of Arcturus

ALRA'TRIA (*alratka*, an [illegible], *Arab.*) A partial or total imperforation of the vagina

ALREADY, *ad* (from *all* and *ready*) At this present time, at some time past (*Pope*).

ALRESFORD, a town in Hampshire, with a market on Thursday, and a small manufacture of linseys Lat 51. 6 N. Long. 1. 1 W

ALS, *ad* (*als*, Dutch.) Also (*Spenser*).

ALSACE, a late province of France, bounded on the E by the Rhine, on the S by Switzerland, on the W by Lorraine, and on the N by the palatinate of the Rhine. It formerly belonged to Germany, but was given to France by the treaty of Munster. It is one of the most fruitful provinces of Europe, abounding in corn, wine, wood, pulse, fruits, flax, tobacco, &c. Here are mines of silver, copper, and lead. The original inhabitants are honest and goodnatured, but wedded to their own manners and customs. Their language is the German, mixed with a little French.

ALSEGNO, in music, an expression [illegible] with this character [illegible] signifies that the performer is to [illegible] [illegible] in the composition [illegible] the first part of the strain.

ALSEN, an island [illegible] in the Baltic, near the coast of [illegible], to [illegible] separated from the main [illegible] channel, called Alsen-Sund, [illegible] six leagues long, and two [illegible] Long. 9. 35 E. Ferro. Lat 55 N

ALSENS, a river of Germany which runs into the Ill, near Pludentz

Alsens, a town of Germany, in the circle of the Upper Rhine, and duchy of Deux Ponts twenty-eight miles W Worms, and six FNE Meissenheim

ALSENZ, a town of Germany, in the circle of the Upper Rhine, and principality of Nassau Weilburg seven miles S Creutznach, and forty NW Manheim

ALSFIELD, a town of Germany, in the circle of the Upper Rhine, in Upper Hesse eighteen miles E Marburg, fifty NE Francfort on the Main Long 26 55 E Ferro Lat 50 35 N

ALSINE Chickweed A genus of the class and order pentandria trigynia Calyx five-leaved; petals five, equal, capsule one-celled, three-valved, seeds numerous It has three species, which are natives of Europe, a segetalis and a mucronata, common to France and Italy, and a media, a very troublesome weed met with too frequently in our own gardens; but which, if boiled till tender, may be eaten like spinach; and which forms also an excellent emollient poultice

ALSINELLA. See Sagina

ALSINOIDES. See Buforia and Montia.

ALSIRAT, in the Mahometan theology, a bridge laid over the middle of hell, finer than a hair, and sharper than the edge of a sword, over which people are to pass, after their trial, on the day of judgment

ALSIUM, in ancient geography, a city of Italy in Etruria, occupying the spot where Palo now stands.

ALSO *ad*. (from *all* and *so*) In the same manner, likewise (*Burnett*)

ALSTON-MORE, a town in Cumberland, with a market on Saturdays Lat 54 50 N Lon. 2. 14 W.

ALSTROEMERIA In botany, a genus of the class and order hexandria, monogynia Corol six-petalled, somewhat two-lipped, the two lower petals tubular at the base, stamens declined It has six species, all natives of South America.

ALT, a river of England, which runs into the Irish Sea, 7 miles W of Ormskirk, in Lancashire.

Alt, in music, a term applied to that part of the great scale of sounds which lies between F above the treble cliff note, and G in altissimo

ALTAI, or Altay mountains, in geography, a chain of mountains in the northern part of Asia, ranking among the most extensive on the globe. They are divided into the Great and the Less Altay. The former separates the [illegible] from the empire of the [illegible] small part of Bukharia [illegible] separates [illegible] of Kolyvan. [illegible] and silver [illegible] as well as [illegible] iron, impregnated with [illegible] They are minutely described [illegible] of Russia, vol i. p 118, &c. vol iii. § 10.

ALTAIR, or Altayr, in astronomy, a star of the first magnitude, marked α in Aquila

ALTAR, a place upon which sacrifices were anciently offered to some deity The heathens at first made their altars only of turf, afterwards they were made of stone, or marble, of wood, and even of horn, as was that of Apollo in Delos Altars differed in figure as well as in materials Some were round, others square, and others triangular All of them were turned towards the east, and stood lower than the statues of the gods, and were generally adorned with sculpture, representing either the gods to whom they were erected or their symbols

According to Servius, those altars set apart for the honour of the celestial gods, and gods of the higher class, were placed on some pretty tall pile of building; and for that reason were called *altaria*, from the words *alta* and *ara*, "a high elevated altar" Those appointed for the terrestrial gods were laid on the surface of the earth, and called *aræ*. And, on the contrary, they dug into the earth and opened a pit for those of the infernal gods, which they called *βόθροι λάκκοι*, "scrobiculi" But this distinction is not every where observed the best authors frequently use *ara* as a general word, under which are included the altars of the celestial and infernal, as well as those of the terrestrial gods

Altars are doubtless as ancient as sacrifices themselves, consequently their origin is not much later than that of the world, (Gen ch iv) Some attribute their origin to the Egyptians, others to the Jews, others to the patriarchs before the flood Some carry them as far back as Adam, whose altar is much spoken of by Jewish and even Christian writers Others are contented to make the patriarch Enoch the first who consecrated a public altar Be this as it will, the earliest altars we find any express testimony of are those erected by Abraham

Among the Jews, altars in the patriarchal times were very rude The altar which Jacob set up at Beth-el was nothing but a stone, which served him instead of a bolster, that of Gideon, a stone before his house and the first which God commanded Moses to erect was probably of earth, or unpolished stones, without any iron; for if any use was made of that metal, the altar was declared impure

The principal altars of the Jews were, the altar of incense; that of burnt-offering, and the altar, or table, for the shew-bread

The altar of incense was a small table of shittim-wood, covered with plates of gold, of one cubit in length, another in width, and two in height. At the four corners were four kinds of horns, and all round a little border or crown over it. This was the altar hidden by Jeremiah before the captivity; and upon it the [illegible] every morning and [illegible] of a particular composition

[illegible] altar of burnt-offerings was made of shittim-wood, and carried upon the shoulders of the priests by staves of the same wood over-

laid with brass. In the time of Moses, this altar was five cubits square, and three high; but in Solomon's temple it was much larger, being twenty cubits square, and ten in height. It was covered with brass, and at each corner was a horn or spire, wrought out of the same wood with the altar to which the sacrifices were tied. Within the hollow was a grate of brass, on which the fire was made, through it fell the ashes, and were received in a pan below. At the four corners of the grate were four rings and four chains, which kept it up at the horns. This altar was placed in the open air, that the smoke of the burnt-offerings might not sully the inside of the tabernacle.

The altar, or table for the shew-bread, was likewise of shittim-wood, covered with plates of gold, having a little border round it, adorned with sculpture. It was two cubits long, one wide, and one and a half in height. Upon this table, which stood in the holy of holies, were put, every sabbath-day, twelve loaves, with salt and incense.

The Jewish altars, after their return from the captivity, and the building of the second temple, were in some respects different from those described above. That of burnt-offerings was a large pile, built of unhewn stone, thirty-two cubits square at the bottom, and twenty-four square at the top. The ascent was by a gentle rising, thirty-two cubits in length, and sixteen in breadth.

ALTAR is also used among Christians for the communion table. In catholic countries, the altar is sometimes sustained on a single column, as in the subterraneous chapels of St Cecilia, at Rome, &c. and sometimes by four columns, as the altar of St Sebastian of Crypta Arenaria, but the customary form is, a massive of stone-work, sustaining the altar table. These altars bear a resemblance to tombs; to this purpose, we read in church history, that the primitive Christians chiefly held their meetings at the tombs of the martyrs, and celebrated the mysteries of religion upon them, for which reason, it is a standing rule to this day in the church of Rome, never to build an altar without inclosing the relics of some saint in it.

A'LTARAGE. *s.* (*altaragium*, Latin.) An emolument arising from oblations (*Ayliffe*).

ALTAR CLOTH. *s.* (from *altar* and *cloth*.) The cloth thrown over the altar in churches (*Peacham*).

ALTAR-THANE, in old law books, a parson of a parish.

ALTDORF, a trading town of Hungary. Lat. 49. 12. N. Lon. 21. 15. E.

ALTDORF, or ALTORF, a large handsome town of Switzerland, having four churches and two convents. Lat. 46. 50. N. Lon. 8. 30. E.

ALTENBERG, a town of Germany, in the duchy of Stiria. eight miles S. Weitsburg.

ALTENBERG, a town of Germany, in the circle of Upper Saxony. six leagues S. Dresden.

ALTENBURG, or OVAR, a town of Hungary, seventeen miles S. Presburg, forty SE. Vienna. Long. 41. 1. E. Ferro. Lat. 47. 56. N.

ALTENBURG, a town of Germany, in the duchy of Stiria, on the Sann. eight miles SSW. Windish Gratz.

ALTENBURG, or OLDENBURG, a town of Germany, in the duchy of Holstein, on a river, which runs into the Baltic, about three leagues to the east, nineteen leagues north east Hamburg, and fourteen east Rensburg. Long. 10. 52. E. Ferro. Lat. 54. 18. N.

ALTENBURG, a town of Germany, in the circle of Upper Saxony, the capital of a principality. twenty miles S. Leipsic, fifty two W. Dresden. Long. 30. 8. E. Ferro. Lat. 50. 50. N.

ALTENBURG, a town of Germany, in the circle of the Upper Rhine, and bishopric of Spire. two miles NW. Bruchsal, and nine SSE. Spire.

ALTENBURG, a town of Germany, in the circle of the Upper Rhine. two miles NW. Wetzlar, and two NE. Braunsels.

ALTENBURG, a town of Germany, in the county of Tyrol. nine miles NE. Glurns.

ALTENBURG, a town of Germany, in the archduchy of Austria. two miles SW. Horn.

ALTENBURG, (Teutsch), a town of Germany, in the archduchy of Austria, near Hamburg.

To ALTER. *v. a.* (*alterer*, French.) 1. To change, to make otherwise than it is (*Stillingfleet*). 2. To take off from a persuasion, practice, or sect (*Dryden*).

To ALTER. *v. n.* To become otherwise than it was, to be changed; to suffer change.

A'LTERABLE. *a.* (from *alter*; *alterable*, Fr.) That may be altered or changed by something else (*Swift*).

A'LTERABLENESS. *s.* (from *alterable*.) The quality of being alterable.

A'LTERABLY. *ad.* (from *alterable*.) In such a manner as may be altered.

A'LTERAGE. *s.* (from *alo*.) The breeding, nourishing, or fostering of a child (*Davies*).

A'LTERANT. *a.* (*alterant*, French.) That has the power of producing changes in any thing (*Bacon*).

ALTERANTIA. A'LTERATIVES. (from *altero*, to change, or alter.) Medicines which produce a re-establishment of the healthy functions of the animal economy, without any perceptible operation.

ALTERATION. *s.* (from *alter*, *alteration*, French.) 1. The act of altering or changing (*Hooker*). 2. The change made (*Hooker*).

ALTERATION, ALTERNATION, or PERMUTATION, of quantities or things, is the varying the order or position of them.

Thus two things, or quantities, *a* and *b*, may either of them stand first, as *a b*, or *b a*, making 1 × 2 = 2, alternations. A third thing *c* may stand three different ways with respect to either of the positions *a b*, or *b a*, of the other two; for it may stand either before, or between, or after them, thus making 1 × 2 × 3 = 6, the changes of three things. In like manner, it will appear that with four things there may be four times as many

changes as with three, making $1 \times 2 \times 3 \times 4 = 24$ And so on, always multiplying the last found number of alternations, by the ordinal number of the next thing added For example, the number of changes which may be rung on twelve bells, will be expressed by the product of $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10 \times 11 \times 12 = 479{,}001{,}600$

ALTERATIVE *a* (from *alter*) Medicines called *alterative*, are such as have no immediate sensible operation, but gradually gain upon the constitution, by changing the state of the humours (*Quincy*)

ALTERCATION *s* (*altercation*, Fr) Debate, controversy, wrangle (*Hakewill*)

ALTE'RN *a* (*alternus*, Lat) Acting by turns (*Milton*)

ALTE'RNACY *s* (from *alternate*) Action performed by turns

ALTE'RNATE *a* (*alternus*, Lat) Being by turns; one after another; reciprocal (*South*)

ALTE'RNATE *s* (from the *adj*) That which happens alternately; vicissitude not generally used (*Prior*)

To ALTE'RNATE *v a* (*alterno*, Latin) 1 To perform by turns (*Milton*) 2. To change one thing for another reciprocally (*Grew*)

ALTERNATE ANGLES, in geometry, are the internal angles A and B (fig. 3 pl. 12), or *a* and *b*, made by a line cutting two parallel lines, and lying on opposite sides the cutting line. It is the property of these angles to be always equal to each other; viz. the angle A = the angle B, and the angle *a* = the angle *b* The exterior alternate angles are also equal, namely C = D, and *c* = *d*

ALTERNATE RATIO, or PROPORTION, is the ratio of the one antecedent to the other, or of one consequent to the other, in any proportion, in which the quantities are of the same kind. So if A B :: C : D, then alternately, or by alternation, A : C :: B : D

ALTE'RNATE (*alternus*) Branches, leaves, peduncles, or flowers, coming out one after or above another, in a regular succession or gradation Contrasted with *opposite*

ALTERNATELY-PINNATE LEAF In botany, when the leaflets or component leaves are arranged alternately on each side of the common petiole.

ALTERNATION. See ALTERATION.

ALTERN, ALTE'RNATIVE ALTE'RNUS (from *alter*, another.) In botany, leaves or shootings not opposite to each other, but first one and then another.

ALTERNATIVE *s* (*alternatif*, Fr.) The choice given of two things; so that if one be rejected, the other must be taken (*Fenny*)

ALTERNATIVELY *ad* (from *alternative*) By turns, reciprocally (*Ayliffe*)

ALTERNATIVENESS *s* (from *alternative*) The quality or state of being alternative; reciprocation

ALTERNITY *s* (from *altern*) Reciprocal succession, vicissitude (*Brown*)

ALTHENONGA (*alhenongâ*, Arab) The herb [illegible], or baum

ALTES, in ancient geography, a town of Peloponnesus, situate on the Caldaus which fell into the river Alpheus

ALTHA, in ancient geography, a town of Babylonia, upon the Tigris, and in dependence upon Apamea, according to Ptolemy

ALTHÆ'A (from ἀλθεῖν, *to heal* so called from its supposed vulnerary qualities) Marshmallow A genus of the class and order monadelphia polyandria, with a double calyx, the exterior divided into from six to nine segments, with a fruit consisting of numerous capsules, each containing a single seed It has nine species, of which the a acaulis, or holly-hock, is one. A officinalis of Linnéus Foliis simplicibus tomentosis. The medicinal part of the plant consists in its gluten or mucilaginous matter, with which indeed it abounds in consequence of which it is employed as an emollient and demulcent in coughs and catarrhs Its root had formerly a place in several preparations of the dispensary; but it is now seldom used but in the form of syrup

ALTHÆ'A FRUTEX. A species of HIBISCUS, which see

ALTHÆMENES, a son of Creteus king of Crete Hearing that either he or his brothers were to be their father's murderer, he fled to Rhodes, where he made a settlement to avoid becoming a parricide After the death of all his other sons, Creteus went after his son Althæmenes, when he landed in Rhodes, the inhabitants attacked him, supposing him to be an enemy, and he was killed by the hand of his own son When Althæmenes knew that he had killed his father, he entreated the gods to remove him, and the earth immediately opened, and swallowed him up *Apollod*

ALTHITH (*halthith*, Arab) Asafœtida The gum of the ferula asafœtida See ASAFŒTIDA

ALTHO'UGH *conj* (from *all* and *though*) Notwithstanding; however (*Swift*)

ALTICA A name given by Fabricius to various species (constituting a tribe) of the coleopterous insect CHRYSOMELA, which see

ALTI'LOQUENCE *s* (from *altus* and *loquor*, Lat) High speech, pompous language

ALTIMETRY, ALTIMETRIA, the art of taking or measuring altitudes or heights, whether accessible or inaccessible The word is compounded of *altus*, high, and μετρεῖν, *metror*, to measure

ALTISONANT, *a.* (*altisonus*, Lat) High-sounding; pompous in sound

ALTISSIMO, a term in music, applied to all notes situated above F in alt; i e such notes as are more than an octave above F on the fifth line of the treble cliff

ALTITUDE *s* (*altitudo*, Lat.) 1. Height of place; space measured upward (*Dryden*) 2. The elevation of any of the heavenly bodies above the horizon (*Brown*) 3. Situation with regard to lower things (*Ray*). 4. Height of excellence; superiority (*Swift*) 5. Height of degree; highest point (*Shaks*)

ALTITUDE, in geometry, is the third dimension of body, considered with respect to its

elevation above the ground and is otherwise called its height or depth, the former, when measured from bottom to top, the latter when measured from top to bottom

Altitude of a figure, is the distance of its vertex from the base, or the length of a perpendicular let fall from its vertex to the base The altitudes of figures are useful in computing their areas or solidities

Altitude, or height of any point of a terrestrial object, is the perpendicular let fall from that point to the plane of the horizon Altitudes are distinguished into accessible and inaccessible

Accessible Altitude of an object, is that to whose base there is access, to measure the nearest distance to it on the ground, from any place

Inaccessible Altitude, of an object, is that to whose base there is not free access, by which a distance may be measured to it, by reason of some impediment, such as water, wood, or the like

To measure or take Altitudes If an altitude cannot be measured by stretching a string from top to bottom, which is the direct and most accurate way, then some indirect way is used, by actually measuring some other line or distance which may serve as a basis, in conjunction with some angles, or other proportional lines, either to compute, or geometrically determine, the altitude of the object sought

There are various ways of measuring altitudes, or depths, by means of different instruments, and by shadows or reflected images, on optical principles There are also various ways of computing the altitude in numbers, from the measurements taken as above, either by geometrical construction, or trigonometrical calculation, or by simple numeral computation from the property of parallel lines, &c

The instruments mostly used in measuring altitudes, are the quadrant, theodolite, geometrical square, line of shadows, &c , the descriptions of each of which may be seen under their respective names.

To measure an Accessible Altitude Geometrically Thus, suppose the height of the accessible tower AB be required First, by means of two rods, the one longer than the other plant the longer upright at C, then move the shorter back from it, till by trials you find such a place, D, that the eye placed at the top of it at E, may see the top of the other, F, and the top of the object B straight in a line next measure the distances DA or EG and DC or EH, also HF the difference between the heights of the rods then, by similar triangles, as EH . EG : · HF the 4th proportional GB , to which add AG or DE, and the sum will be the whole altitude AB sought Fig. 1. pl 12.

Or, with one rod CF only: plant it at such a place C, that the eye at the ground, or near it, at I, may see the tops F and B in a right line then, having measured IC, IA, CF, the 4th proportional to these will be the altitude AB sought.

Or thus, by means of shadows Plant a rod *ab* at *a*, and measure its shadow *ac*, as also the shadow AC of the object AB, then the 4th proportional to *ac*, *ab*, AC will be the altitude AB sought Fig 6

Or thus, by means of optical reflection Place a vessel of water, or a mirror or other reflecting surface, horizontal at C, and move off from it to such a distance, D, that the eye E may see the image of the top of the object in the mirror at C then, by similar figures, CD DE CA AB the altitude sought Fig 7

Or thus, by the geometrical square At any place, C, fix the stand, and turn the square about the centre of motion, D, till the eye there see the top of the object through the sights or telescope on the side DE of the quadrant, and note the number of divisions cut off the other side by the plumb-line EG then as EF FG · DH HB, to which add AH or CD, for the whole height AB. Fig. 2

To measure an Accessible Altitude Trigonometrically At any convenient station, C, with a quadrant, theodolite, or other graduated instrument, observe the angle of elevation ACB above the horizontal line AC; and measure the distance AC Then, A being a right angle, it will be, as radius is to the tangent of the angle A, so is AC to AB sought. Fig 4

If AC be not horizontal, but an inclined plane, then the angle above it must be observed at two stations C and D in a right line, and the distances AC, CB, both measured. Then, from the angle C, take the angle D, and there remains the angle CBD; hence in the triangle BCD, are given the angles and the side DC, to find the side CB; and then in the triangle ABC, are given the two sides CA, CB, with the included angle C, to find the third side AB, Fig. 5.

Or thus, measure only the distance AC, and the angles A and C · then, in the triangle ABC, are given all the angles and the side AC, to find the side AB

To measure an Inaccessible Altitude, as a hill, cloud, or other object. This is commonly done, by observing the angle of its altitude at two stations, and measuring the distance between them Thus, for the height AB of a hill, measure the distance CD at the foot of it, and observe the quantity of the two angles C and D. Then, from the angle C taking the angle D, leaves the angle CBD, hence

As sine CBD · sine D CD CB; and
As radius sine ACB . : CB : AB the altitude. Fig 8

When this method is used to find the altitude of a cloud, balloon, or other moveable object, the angles of its altitude must be taken at the same moment by two observers, who are situated in a vertical plane, which will pass through the object.

When an object can neither be approached to, nor receded from, in the line of direction of that object, its altitude may still be found without having recourse to horizontal angles, thus: Let any two distances CD=D, DE=*d*

(fig 6.) be measured in a right line lying in the same horizontal plane with the bottom B of the vertical object, and at the points C, D, E, let the angles of elevation ACB$=a$, ADB$=b$, AEB$=c$, be taken, then we have the height AB of the object

$$= r\sqrt{\frac{Dd\delta}{D\cot^2 a + d\cot^2 c - 2\delta\cot^2 b}},$$ where r is the radius and $\delta = D + d =$ CE. If CD$=$DE, or D$=d$, then D$+d = 2d = \delta$, and the altitude $h = \frac{rd}{\sqrt{(\frac{1}{2}\cot^2 c + \frac{1}{2}\cot^2 a - \cot^2 b)}}$, from which we have this logarithmic rule.—Double the log. cotangents of the angles of elevation at the extreme stations, find the natural numbers answering thereto, and take half their sum; from which subtract the natural number answering to twice the log cotangent of the middle angle of elevation then, half the log of this remainder subtracted from the log of the measured distance CD or DE, will be the log of the height of the object

It is manifest that in these, or any other methods of ascertaining altitudes trigonometrically, the accuracy of the result will depend upon the accuracy and care with which the angles are taken. Some mathematicians (particularly Mr. Cotes, in his excellent little treatise "De estimatione errorum in mixta mathesi") have examined in what manner the result would be affected by any supposed error in the angles. This matter may be exemplified by referring to the most simple case in taking altitudes, namely, when the object is accessible and perpendicular to the horizon, as AB, fig. 5. It has been found by a fluxional process, that *the error of the height* AB, *is to the measure of the error of the angle* C, *as the double of the height is to the sine of double the observed angle.* The error, therefore, which can happen in the determination of the said height, will be the least possible when the sine of double the observed angle is the greatest possible, i. e. when this angle is 45°. Hence appears the propriety of moving to and fro on the base AC, until the observed angle is as near as possible to 45°. If a mistake of one minute of a degree be committed in the determination of the angle C, then, if radius be = 10000000, the arc of a minute which measures the supposed error, will be 2909, the double of which is 5818; but this quantity is to the *sine* of double the angle 45°, i. e. to radius, as 1 to 1719, therefore, on this supposition the error in the height will be 1-1719th part of the height itself. If the error of the angle C be increased or diminished, the error of the height will be increased or diminished in the same ratio. And if the angle observed be greater or less than 45°, the error of the height will be increased in the ratio of radius to the sine of double the said angle.

Other methods of taking altitudes, &c. may be seen in Dr. Hutton's comprehensive treatise on Mensuration, and in Mr. Bonnycastle's and most other works on Trigonometry.

There is a very easy method of taking terrestrial altitudes, such as mountains, &c by means of the difference between the heights of the barometer observed at the bottom and top of the same, which see under the article BAROMETER

Altitude of the Eye, in perspective, is a right line let fall from the eye, perpendicular to the geometrical plane

Altitude of the Pyramids in Egypt, was measured so long since as the time of Thales, which he effected by means of their shadow, and that of a pole set upright beside them, making the altitudes of the pole and pyramid proportional to the lengths of their shadows. Plutarch has given an account of the manner of this operation, which is one of the first geometrical observations we have an exact account of

Altitude, in astronomy, is the arch of a vertical circle, measuring the height of the sun, moon, star, or other celestial object, above the horizon

This altitude may be either true or apparent. The apparent altitude is that which appears by sensible observations made at any place on the surface of the earth. And the true altitude is that which results by correcting the apparent, on account of refraction and parallax

The quantity of the refraction is different at different altitudes, and the quantity of the parallax is different according to the distance of the different luminaries in the fixed stars this is too small to be observed, in the sun it is only about 8¾ seconds; but in the moon it is about 58 minutes, at a mean.

The altitude of a celestial object may be very accurately determined, by measuring the arc of an oblique great circle intercepted between the star and the horizon, and the inclination of the same great circle to the horizon. This may be put in practice by means of the equatoreal, thus let the sine of the estimated altitude of the object be s, elevate the equatoreal circle above the horizon to an angle, the sine of which $= \sqrt{s}$, rad being $= 1$. The declination circle being set to 0, direct the line of collimation to the star, by the equatoreal and azimuth circles moved in their own planes, observe the arc of the equatoreal circle intercepted between the index and VI, if the sine of this arc $= p$, the sine of the observed altitude will be equal to $p\sqrt{s}$, radius being 1. This indirect method has many advantages; and is, in general, less exposed to errors than the direct method in about the proportion of 1 to 7. Atwood's Lectures, p. 198, 227

Meridian Altitude of the Sun, or any celestial object, is an arch of the meridian intercepted between the horizon and the centre of the object upon the meridian. The altitude of a celestial body is greatest when it comes to the meridian of any place (the poles of the earth excepted, for there the altitude of a fixed body is subject to no variation); and the altitude of any star which sets not, is least, and the depression of any star which does set, is greatest, when in the opposite part of the meridian.

Altitude of the Pole, is an arch of the meridian intercepted between the horizon and the pole it is equal to the latitude of the place

Altitude of the Equinoctial, is the elevation of that circle above the horizon, and is always equal to the complement of the latitude

Refraction of Altitude, is an arch of a vertical circle, whereby the altitude of a heavenly body is increased by refraction And *Parallax of Altitude*, is an arch of a vertical circle whereby the altitude is decreased by parallax

Altitude of the Earth's or Moon's Shadow, in eclipses See ECLIPSE

Altitude Instrument, or Equal Altitude Instrument, one used to observe a celestial object when it has the same altitude on the east and west sides of the meridian.

Observations of this kind are made for the purpose of obtaining the true time of the sun s passing the meridian various modes of calculation have been recommended at different times, but we know of none (independent of tables) that is preferable to the following method of deducing the true time of the sun's passing the meridian, by the clock, from a comparison of four equal altitudes, observed on two succeeding days The rule was invented by the celebrated Dr Rittenhouse, the American astronomer.

Suppose there are four sets of altitudes obtained on two successive days, (viz one set in the morning, and one in the afternoon of each day), the instrument being kept at exactly the same height both days, then the exact time of the sun s passing the meridian per clock, may be readily obtained by the following

Rule Take the difference in time between the forenoon observations of the two days, and also between the afternoon observations

Call half the difference of the two differences, X,
And half the sum of the two differences, Y,
Let the half interval between the two observations of the same day, be Z

Then, if the times of the altitudes observed on the second day be both nearer 12, or both farther from 12 per clock, than on the first day X will be the daily variation of the clock, from apparent time, and Y will be the daily difference, in time, of the sun s coming to the same altitude, arising from the change of declination. And the proposition will be

24^h Y Z E, the equation sought which will be found the same (without any sensible difference) as the equation obtained from the tables

But of one of the observations on the second day be nearer 12, and the other more remote from 12, than on the first day, then Y will become the daily variation of the clock from apparent time, and X will be the daily difference in time of the sun's being at the same altitude And the proportion will be

24^h X Z E

The equation, E, thus obtained, is to be subtracted from the mean noon, if the sun's meridian altitude be daily increasing, but to be added, if it be daily decreasing The reason of all this is very plain, and its mode of application so obvious that it is needless to give examples in this place several, however, may be seen in the first volume of the American Transactions, whence the rule was extracted

Altitude, circles of, parallels of, quadrant of, &c See the respective words

ALIMORI, a town of Ireland, in the county of Tyrone Lat 54 30 N Lon 7. 18 W

ALTO, in music, the highest natural tenor voice

ALTO ET BASSO, *or in Alto and in Basso*, in law, signifies the absolute reference of all differences small and great, high and low, to some arbitrator or indifferent person

ALTO RIPIENO, in music The tenor of the great chorus, which sings or plays in the full part of the concert, occasionally

ALTOGETHER *ad* (from *all* and *together*) Completely, without restriction, without exception (*Swift*)

ALTON, a town in Hampshire, with a market on Saturday Lat 51. 22 N Lon 0 56 W

ALTORF, or ALTDORF, a district of Nuremberg, in Germany. Here is a university, a library, and a physic garden. Lat. 49. 30 N Lon. 11 22 E.

ALTORF, a town of Suabia, Germany. Lat. 47 50 N Lon. 9 30 E.

ALTRINGHAM, a town of Cheshire, with a market on Tuesdays. Lat. 53. 24 N. Lon 2 34 W.

ALVA (Ferdinand Alvarez, duke of), was born in 1508 He distinguished himself by his valour and military skill when young, and in 1538 was made general by Charles V. whom he served against the German protestants, the French, and the pope As Alva, however, was a bigoted catholic, the last service displeased him, and he asked the forgiveness of the pontiff whom he had vanquished Philip II. sent him into the Low Countries in 1567, to reduce them to the Spanish yoke, from which they were about to revolt. Here he established a council which was called the Bloody Tribunal. He filled the United Provinces with terror and scenes of carnage, for which his memory is held in detestation to this day. After obtaining great advantages over the malcontents, the tide of success turned in their favour so rapidly, that Alva, in a fit of dejection, solicited his recal, in 1573, which was granted. He enjoyed considerable marks of distinction from his sovereign for some time, but at last fell into disgrace through the misconduct of one of his sons He was afterwards employed against Portugal, where he greatly added to his military renown, by driving don Antonio from the throne, in 1581 He died the same year, aged 74 *Watkins*.

ALUCETA, a name given by Fabricius to various species (constituting a tribe or family) of the lepidopterous insect phalaena or moth, corresponding with the tinea of Gmelin See PHALAENA.

ALUDELS, certain pots or vessels made of earthen-ware or glass, open at both ends, and may be inserted and applied above each other, so that the whole shall form a pipe or tube more or less long according to the number of aludels composing it The aludel which terminates this tube above, ought to be closed in its upper part, or to have but a very small opening The tube composed of these aludels is nothing but a kind of capital or head, which may be enlarged or lengthened at pleasure, and adapted to a cucurbit. This apparatus is intended to collect and retain dry and volatile matters, which may be reduced into flowers by sublimation It was employed for the preparation of flowers of sulphur, of arsenic, of antimony, of benjamin, &c , but is now generally discarded, since the shops are supplied from wholesale laboratories, where more convenient apparatus are employed. See pl. 11 fig. 7 , where A is the cucurbit, B a series of aludels, and C the capital

ALVEARIUM, in anatomy, (from *alveare*, a bee-hive,) that part of the meatus auditorius, or conch of the external ear, which contains its wax.

ALVEHEZIT, among Arabian writers, denotes what we ordinarily call falling-stars, or star-shot.

ALVEOLATE. (*Alveolatum s. favosum*) receptacle. Divided into open cells, like an honey-comb, with a seed lodged in each: as in [illegible].

ALVEOLUS, in anatomy, the socket-like cavity in the jaws, wherein each of the teeth is fixed.

ALVEOLUS, in the history of fossils, a marine body, not known at present in its recent state, but frequently found fossile The alveoli are of a conic shape, and composed of a number of cells, like so many beehives jointed into one another, with a pipe of communication, like that of the nautilus. They are sometimes met with entire, but more frequently truncated, or with their smaller ends broken off

ALVEUS, in antiquity, a small boat made of the trunk of a single tree

ALVEUS, (from *alvus*, a paunch, being as it were the reservoir whence a fluid is carried) The tube or channel of a fluid, in medicine, chiefly that of the chyle

ALVIDUCA, (*Alviduca sc medicamenta*) Medicines which open the bowels

ALVIFLUXUS. A purging

ALUMEN, (*alum*, Arab) Alum A neutral salt formed by a combination of the earth called alumine, alumina, or pure clay, with sulphuric acid. The commercial and medicinal alum is the same, and is called in the new chemical nomenclature sulphas aluminæ acidulus cum potassa, (sulphate of alumine with potass or [illegible]) [illegible] It [illegible] the [illegible] which are dug out of the [illegible] for this purpose, and manufactured by first decomposing the ore, then lixiviating it, evaporating the lixivium, and then crystallizing the alum, which exhibits the form of octahedral pyramids, applied to each other, base to base, the angles being occasionally truncated The following are the chief species of ore

Alum native, or fossil alum found crystallized by nature without the assistance of art

Alum plumose, or plume alum alum naturally crystallized in the form of threads or fibres resembling feathers

Alum prepared, or purified alum dissolved in pure hot water, (rain or distilled,) and crystallizing after a sufficient evaporation

Alum rock, or ice-alum so named from Rocca, now called Edessa in Syria, where it is found in large transparent masses of native crystallization, but not very pure It was in this place that the earliest alum manufactories were established of which we have any account

Alum Roman: prepared in the territory of Civita-Vecchia, from native masses not unlike the rock alum It is imported in lumps of the size of eggs, covered with a reddish tincture.

Alum saccharine: a composition of common alum dissolved in rose water, clarified by the whites of eggs, and formed, after boiling to a due consistency, in the shape of a sugar-loaf, whence its name. It is used as a cosmetic

Alum, on its first taste, imparts a sweetness, but is soon felt to be strongly astringent, on account of which virtue it is of extensive use in medicine and surgery Internally it is given in hæmoptoe or blood-spitting, colica pictonum, chronic pains of the bowels and enuresis Externally it is applied as a styptic to bleeding vessels and to phagadenic ulcers

Exposed to the fire, alum at first becomes liquefied, much aqueous vapour or water of crystallization exhales from it, and it swells into a large white mass, rough and full of cavities all over its surface This production is termed alumen ustum or burnt alum, and is sometimes employed in surgery to destroy fungous flesh, as well as for particular kinds of ophthalmies Besides this preparation alum enters the aqua aluminis composita, and the coagulum aluminis of the pharmacopœias

Alum, or alumen, dissolves in from ten to fifteen times its weight of cold water, according to its purity, but boiling water will dissolve more than its weight of alum It crystallizes by evaporation and cooling, the figure of its crystals varying with circumstances half its weight of water is retained in crystallizing The crystals dissolve in about seventeen times their weight of cold water Alum swells when heated, loses its regular form and the water which it contained, and becomes a light white substance called burnt, or calcined alum. In a more violent degree of heat it loses part of its acid, and becomes tasteless; is no longer susceptible of crystallization, but precipitates from its solution, in a very fine adhesive powder Magnesia, baryt, and the alkalies, precipitate it from this solution; but the alkalies, added in excess, re-dissolve it.

By the addition of more alumine the glass selenite of Baumé is formed, which is almost tasteless and insoluble, and exhibits cubic crystals.

If three parts of alum, and one of flour or

sugar, be melted together in an iron ladle, and the mixture dried till it becomes blackish and ceases to swell, and if it be then pounded small, put into a glass phial, and placed in a sand-bath till a blue flame issues from the mouth of the phial, and after burning for a minute or two be allowed to cool, a substance is obtained known by the name of Homberg's pyrophorus, which has the property of taking fire whenever it is exposed to the open air, especially if the air be moist.

Chaptal informs us that alum is capable also of combining with several other bases, and of forming many triple salts which have never yet been examined with attention.

Of all the various kinds of alum, that distinguished by the name of Roman alum is generally reckoned the best, particularly for the purposes of dying, in which art alum is extremely useful, as by means of it a great number of colours are fixed and rendered permanent upon cloth. It constitutes the basis of crayons, which generally consist of the earth of alum finely powdered and tinged for the purpose. In the preparation of Prussian blue, it prevents the basis of martial vitriol, which is soluble in acids, from being precipitated by the superfluous alkali employed in the preparation of that pigment, that is, the alkali which is not saturated by the colouring matter. As this basis adheres more strongly than the clay to the vitriolic acid, and would form a green by the mixture of its yellowness, the white earth of alum likewise, according to its quantity, dilutes the darker colours, even black itself, and produces an infinite number of shades. It is also of use in the making of candles, for being mixed with the tallow, it gives it a hardness and consistence which it has not naturally. Wood sufficiently soaked in a solution of alum does not easily take fire, and the same is true of paper impregnated with it, which for that reason is very properly employed in preserving gunpowder, as it also excludes the moisture of the air. Paper impregnated with alum is useful in whitening silver, and silvering brass without heat. Alum is also of use in tanning, where it assists in restoring the cohesion of the skins almost entirely destroyed by the lime. Vintners fine down their wines, &c. with alum; fishers use it to dry cod-fish with; and bakers have mixed it with the flour to make their bread compact and white, to the last use of it, great objections have been made. The sole reason ascribed for its use is, that corrupt flour being mixed with good thus acquires a proper degree of cohesion, as the aluminous particles equally pervade the whole mass, and render it of a due consistence. Although some writers have maintained that alum is now seldom used in the making of bread, and when used is entirely innocent; yet there is too much reason to believe the contrary, and to fear that the abuse of alum, and other pernicious materials introduced by our bakers, is one lamentable source of the numerous diseases of children. For the methods of detecting this adulteration, see the article BREAD.

"Dr Willich, in his Domestic Encyclopædia, remarks that one of the most important purposes to which alum may be readily applied, is that of purifying and sweetening water that has become fetid and unfit for use. On long voyages, or at a distance from clear rivers and wells, each gallon requires, according to its impurity, only from five to ten grains of calcined alum, and double or triple that proportion of powdered charcoal, in order to render the most offensive water perfectly sweet and pellucid: both ingredients, however, ought to be preserved in close vessels, otherwise their efficacy will be considerably diminished."

Manufacture of Alum. This useful salt was first discovered in the eastern countries, from whence it continued to be imported till the 15th century, when the Italians, who had hired the alum works in the neighbourhood of Constantinople, introduced the art of manufacturing it into their own country. In the 16th century it was manufactured in Germany and Spain, and soon afterwards alum works were established in England.

The alum of commerce is usually obtained from the fossils, or ores of alum, or from earths containing sulphur and clay, or sulphuric acid and clay. There are various ways of obtaining it, according to the peculiar process of the country in which it is manufactured, and the materials from which it is procured. The general principles of the operation may be understood from the method practised by professor Chaptal, which has the advantages of simplicity and convenience to recommend it. A common process is to dissolve alumine in the sulphuric acid, by calcining the clay, impregnating it with the acid, and facilitating its action by a heat of from 145 to 167 degrees of Fahrenheit's thermometer, but Chaptal's consists in presenting the acid in vapours, and under the dry form, to the clay properly prepared. For this purpose he calcines his clays, and reduces them into small pieces, which he spreads on the floors of leaden chambers. The sulphuric acid, which is formed by the combustion of a mixture of sulphur and saltpetre, expands itself in the cavity of these chambers, and exists for a certain time in the vaporous state. In this form it has a stronger action than when it has been weakened by the mixture of a quantity of water more or less considerable: so that it seizes the earths, combines with them, causes them to increase in bulk by the efflorescence which takes place, and at the end of several days the whole surface exposed to the vapour is converted into alum. Care must be taken to stir these earths from time to time, that they successively present all their surfaces to the action of the acid. But whatever process may be used to combine the acid with clay, it is necessary to expose the aluminated earths to the air during a greater or less space of time, in order that the combination may be more accurate, and the saturation more complete. Almost all the alum employed in commerce is afforded by ores which are dug out of the earth for this purpose. All the operations of

this manufacture may be reduced to four, the decomposition of the ore, the lixiviation of the ore, the evaporation of these lixivia, and the crystallization of the alum The decomposition of the mineral is effected either in the open air without assistance, or else by means of fire When the mineral is left to decompose spontaneously, nothing more is necessary than to dispose the stone which contains the principles of alum in strata or layers The pyrites become heated, acid is formed, which dissolves the clay, and the salt arising from this combination exhibits itself by the efflorescence of the ore The decomposition may be accelerated by watering the heap of pyrites, and the operation may be still more abridged by the assistance of fire The method of applying the heat however varies very much It ought not in general to be either too strong or too weak In the first case it volatilizes the sulphur, and in the second it retards the operation The ore of alum is sometimes found impregnated with a sufficient quantity of bitumen to maintain the combustion

In cases where the ore has effloresced into alum, the salt is extracted by lixiviation For this purpose the same water is passed over several heaps of aluminous earth, in order to saturate it. The water which is first passed over the earth dissolves in preference the vitriol, which is more or less abundant; and this salt may be separated from the alum by a previous cold washing. This lixivium, or saline solution, is carried into leaden caldrons, where the fluid is properly concentrated. In this part of the process it is that an accurate saturation of the alum is effected when the acid is in excess, and for this purpose alkalies are added, which serve likewise singularly to facilitate the crystallization. It has been proposed by professor Bergmann to boil clay with the solution, to saturate the excess of acid This process would seem in every point of view advantageous, but Mr Chaptal thinks it impracticable, because the superabundant acid cannot be made to combine with the clay but by a very long ebullition; and he has remarked, that, by afterwards evaporating the fluid to cause it to crystallize, this clay falls down, and opposes the crystallization This ingenious chemist varied the process in different ways, without obtaining the success which its celebrated author predicted There are methods of greater or less accuracy to judge of the degree of concentration to which it is proper to carry the lixivium, in order to obtain a good crystallization; such as, the immersion of an egg in the liquid, the effusion of some drops of the lixivium on a plate, &c. M. Guyton Morveau has proposed a metallic hygrometer; but this instrument cannot be considered as very accurate, because its immersion in the liquid is [illegible] to the heat of the fluid in which [illegible] When the lixivium is, at length, [illegible]ted for crystallization, it is con[illegible] [illegible]lers, where it deposits crystals by [illegible]poration, which are afterwards refined in

Monsieur Lampadius has discovered a method of preparing alum from pyrites and clay, the former yielding, by combustion, the acid with which the clay is combined See the Philosophical Magazine, vol 23, p 66, &c.

Alum ustum See ALUMEN

ALUMINARIS In oryctology, a genus of the class earths, order argillaceous consisting almost entirely of alumine meagre to the touch, light, without lustre, earthy, adhering a little to the tongue, shining a little nearly soluble in nitric acid, contracting and hardening in the fire, emitting sparks before the blow-pipe. The only species is a nativa Native argil, native argillaceous earth, native alumine Earth of alum Pure clay Found in various parts of Britain, Muscovy, and Saxony Pure alumine is contained in a large proportion in common clays, pipe-earth, slate or schistus, steatites and various stones. It is never found pure in its native state with the acids it is known to form more than twenty species of neutral salts, of which alum or aluminous sulphat, is the most common as well as the most useful. The aggregative force of aluminous earth being weak, renders it much more susceptible of combination than other kinds of earth, and accordingly clays are much seldomer found pure than either quartz or rock-crystal Whence it may be easily inferred, why clays are almost always coloured, and why few of them possess all the properties of the aluminous character in any eminent degree Aluminous earth suffers an alteration from the action of heat, to which silicious earth is not liable Instead of remaining like the latter, unchanged when exposed to an ardent heat, it acquires an addition of aggregative force, it even assumes, in such circumstances, some of the properties of the silicious earth, its hardness and aversion to combination Water acts on aluminous earth, penetrates into its substance, adheres to it, and renders it soft and ductile The existence of this combination appears from the difficulty with which the adhesion between these two substances is overcome, a strong and long continued heat being necessary to effect a separation between them The properties which this species of earth possess of composing a paste with water, and becoming hard by the action of fire, render it a very valuable material in the arts (*Fourcroy*), The first of these properties, however, it frequently loses in consequence of the second, for after being well baked, as is the case with bricks and pottery ware, water is incapable of forming it into a paste To restore this property the alumine must be dissolved in an acid, and precipitated A considerable degree of heat renders it hard enough to give fire with steel, and it has been made, both by Boyle and by Lavoisier, to cut glass like diamond

Alumine is capable of combining with a vast number of other bodies; and it is found to be a principle in many compounds, particularly in those stony or earthy masses of which our globe appears to be chiefly composed. With the sulphuric acid, it forms sulphat of

alumine, or alum. When uncombined, it is infusible, except by the flame of oxygen gas, but when mixed with phosphat or borat of soda, it may be fused as readily as lime and magnesia. A mixture of the two latter substances with alumine, forms a porcelain by fusion, but for this purpose the proportion of alumine must be greater than that of lime, and at least equal to that of magnesia.

Pure alumine may be obtained by precipitating a solution of alum in water, by the crystallized carbonat of potash. To purify it completely from its sulphuric acid, Guyton advises that the precipitate be redissolved in nitric acid, that nitrat of baryte be cautiously added to the solution, till it no longer occasions milkiness, and that the alumine be afterwards precipitated, or separated from the nitric acid by heat. Vauquelin and Berthollet procure it from such of the natural clays as contain only silex and alumine, by digestion in muriatic acid, and decomposition of the solution by ammonia. Others precipitate it from a solution of alum in water, by ammoniac, and by the carbonat of ammoniac (sal volatile), and Theodore Saussure says this method will afford two kinds of alumine, according to the quantity of water employed in the solution. If the water be just sufficient to dissolve the alum, a very light white earth is obtained, which he calls spongy alumine; if a very large quantity of water be employed, the result of precipitation is a transparent mass, yellow and brittle, about ten times the weight of the former, and which he terms gelatinous alumine. These two forms differ chiefly in their capacity for retaining water when heated, which is much greater in the gelatinous kind. See Philosophical Magazine, vol. X. p. 152.

The difficulty of fusing alumine, and its power of contracting as its temperature is increased, render it a very proper substance for indicating the higher degrees of heat. On these accounts it has been employed, and very successfully, as a pyrometer, by the celebrated Mr. Wedgwood, whose improvements in the manufacture of pottery and china ware, in which alumine is an essential ingredient, entitle him to the esteem and gratitude of his country.

ALUMINE. See ALUMINARIS.

ALUMINOUS, relating to alumine, or partaking of its nature.

ALUMINOUS SALTS, are those formed by the combination of the different acids with alumine, or pure clay. These salts are in general more imperfect than any of the neutral salts with which chemists are acquainted. Their properties, with the exception of alum, have not been accurately investigated, and therefore they are not much known. Accounts of these salts will be given under the divisions to which they respectively belong; viz. that which is formed by the union of alumine with the nitric acid, will be described under nitrat of alumine; that formed with the sulphuric acid, under sulphat of alumine; and so on, according to the name of the acid which enters into the composition of the salt.

ALUMINOUS MURIAT, CARBONAT, &c. the same as MURIAT, CARBONAT, &c. of ALUMINE, which see.

ALUN CATIN, or stone-soda, a sort of semi-vitrified substance, or imperfect soda, formed at Cherbourg by stirring and kneading together with large poles the hot ashes of the plant varech. This substance is used in the making of glass.

ALUNTIUM, ALONTIUM (ancient geography), a town in the north of Sicily, situated on a steep eminence, at the mouth of the Chydas (*Ptolemy, Pliny, Cicero*), said to be as old as the war of Troy (*Dionys. Halicar.*). Now in ruins, from which arose the hamlet St. Filadelfo, in the Val di Demona. The inhabitants were called Haluntini (*Cicero*).

ALURNUS. In entomology, a genus of the order coleoptera, which see. The generic character is as follows. Antennas filiform, short; tentaculi or feelers, from four to six, very short; jaw horny, arched. It comprises only three species.—1. A. grossus. Feelers six; thorax scarlet; shells yellow; inhabits South America and India.—2. A. femoratus. Feelers four, brassy-green; thighs and hind-shanks toothed. Inhabits India.—3. A. dentipes. Feelers four, black; thighs and hind-shanks toothed or dentated. Inhabits the Cape of Good Hope.

ALUTA, (quasi *aluta*, from *abluo*, to wash.) Cleaned and prepared leather, such as is used to spread plasters upon.

ALUTA, a village of Palestine, placed by Jerome, near the river Chebron.

ALVUS, (Scaliger derives this word from *alluo*, to cleanse; Virgil from *alo*, to nourish, as being the reservoir of nutriment.) The abdomen. This term is now applied to the state of the intestinal canal: thus, when the bowels are relaxed, it is called alvus liquida; when costive, alvus dura, and when very costive, alvus adstricta.

ALWAYS. *ad.* (eallepæga, Saxon.) 1. Perpetually, throughout all time (*Pope*). 2. Constantly, without variation (*Dryden*).

ALYPON Montis Ceti. See CONVOLVULU.

ALYPUM. See GLOBULARIA.

ALYSSON ROUGHLEAVED. See SUBULARIAS.

ALYSSUM. Madwort. A genus of the class and order tetradynia siliculosa, thus distinguished. Silicle slightly emarginate, margined, crowned with the style; the valves concave and crowned with the [illegible]; two of the filaments generally marked with a small tooth. There are thirty-three [illegible] inhabitants of Europe; of which [illegible] tivum, or common madwort, [illegible] to our own country, and may be [illegible] wild in our corn fields. They may all [illegible] arranged under those with shrubby stems; with herbaceous stems; and with silicles inflated, or calyx oblong and closed.

ALYTARCHA, a priest who presided over those who kept order in the Olympic games

ALYXIA, in botany See GYNOPOGON

A M *artium magister*, or master of arts

AM The first person of the verb *to be* See To BE (*Prior*)

AMABILITY *s* (from *amabilis*, Latin) Loveliness, the power of pleasing (*Taylor*)

AMABYR, a sum of money formerly paid to the lord, when a maid within his lordship was married The word is ancient British, and signifies "the price of virginity"

AMACK, an island of Denmark, divided from Seeland by a narrow channel, over which are two bridges, which form a communication with the city of Copenhagen It contains several villages, and about 800 inhabitants

AMADABAT, or AMADAVER, a large, trading, and strong city, the capital of Cambaya, in the East Indies This city is about 5 miles long, and 17 in circuit In the town is such an intermixture of gardens and groves, that afar off it has the appearance of a forest This town was taken by the English East India company's forces, February 15, 1780, under general Goddard, with the loss of only 100 men Lat 23, 10 N Lon. 72 22 E

AMADAN, a town of Persia, in the province of Irak Agemi, eighty-five miles NE Ispahan Lon. 48, 36 E Greenwich Lat 35, 20 N

AMADIA, a fortress of Asia, in the province of Kurdistan fifty miles SW Betlis.

AMADOT *s*. A sort of pear

AMADOW, a kind of black match, tinder, or touchwood, which comes from Germany It is made from spongy excrescenses, which often grow on old trees, especially oaks, ash, or firs This substance being boiled in common water, and afterwards dried and well beaten, is then put into a strong ley prepared with saltpetre, after which it is again put to dry in an oven, when it is fit for use

AMADOWRY, a kind of cotton, which comes from Alexandria, by way of Marseilles

AMADUVADE A species of finch or fringilla, whose specific character is, brown and reddish spotted with white, beneath yellowish; tail-feathers black with a white spot at the tip It is called amandava by Linnéus The species consists of two varieties See FRINGILLA

AMAIN, *ad* (from *main*, or *maigne*, old Fr) With vehemence, with vigour (*Dryden*)

AMAIN, in the sea-language, a term importing to lower something at once Thus, to strike amain, is to lower, or let fall, the topsails; to wave amain, is to make a signal, by waving a drawn sword, or the like, as a demand that the [illegible] their topsails

AMAK. See [illegible]

AMALAGO, [illegible] See PIPER.

AMALANCHIER. [illegible]

AMALEKITES, by [illegible] to be the descendants of [illegible] of Esau; by others, to [illegible] tribe. They were a [illegible] fore devoted to destruction They lived to the east of the Lacus Asphaltites, next the Moabites to the south, and the Ammonites to the north A branch of them dwelt to the south of Canaan

AMALFI, an ancient town of Italy, subject to Naples Lat 40 28 N Lon 14 45 E

AMALGAM, in chemistry and the arts, a mixture or alloy of any of the other metals with mercury The word is formed of the Greek ἅμα, *together*, and γαμεω, *to join or marry*, expressing the close adherence of the substances which compose the amalgam

As mercury is habitually fluid in the common temperature, and as it is sufficient for most combinations that one of the bodies be fluid, it follows that without the help of heat, mercury may be amalgamated with many of the metals Hence there are two methods generally used in the making of amalgams The first is merely by trituration in a mortar, and without heat; the second is by fusing the metal which is to be amalgamated, and by adding to it, when fused, the intended quantity of mercury

Amalgams are more or less soft according to the proportion of mercury employed if this be small they become solid, but brittle, and capable of being pulverised, if it be more considerable, a kind of paste is formed which has no ductility or tenacity, and if the proportion of mercury is very great, the amalgam is only distinguished from that substance by an appearance of foulness

The amalgamation of all metals with mercury is much facilitated by heat, and the amalgamation of those metals which unite difficultly with mercury, cannot be effected without heat For this purpose, the mercury ought to be heated till it begins to rise in vapours, and the metals of difficult fusion, which we suppose to have been previously divided into small parts, ought to be made red by fire, and quickly triturated with the hot mercury As to the metals which melt before they become red, such as tin and lead, it is sufficient to melt them, and to throw the mercury upon them, stirring a little the mixture and thus the amalgam is made in an instant

It would be very imprudent to melt metals which require a great heat for their fusion, as copper, for instance, and to add mercury to this melted metal, with an intention to make an amalgam; because not only the greatest part of the mercury would be dissipated in vapours before it could be united to the metal, but also because there would be great danger of explosion from the mercury, which being a rarefiable and volatile body, is capable, like all such bodies, of producing this effect, when suddenly exposed to too great heat In this and similar instances the moist way is preferable See *Amalgam of Copper*, below

The specific gravity of amalgams, as of all other alloys, differs from the mean specific gravity of their component parts; sometimes it is greater, at other times less; and according

to Gellert, the amalgam of silver is of superior specific gravity even to mercury, the heaviest of the two ingredients. This, however, is only at a low temperature, for the amalgam of silver, when heated, floats on the surface of mercury.

A solid amalgam of lead, and another of bismuth, on admixture together, have the singular property of instantly becoming fluid (*Henry*).

Amalgams crystallize much more readily, and more distinctly, than metals. They may be decomposed by heat, but the last portion of mercury is not easily driven off, and frequently not at all without volatilizing part of the metals. An amalgam may also be decomposed by the addition of a metal that has a stronger affinity for mercury than that of which the amalgam is composed, and, in particular circumstances, one amalgam may even decompose another.

We shall now describe the methods of preparing the different amalgams, in their alphabetical order, and notice the uses to which they are respectively applied.

Amalgam of Antimony, is prepared by melting the antimony in a crucible, withdrawing it from the fire till it is on the point of becoming solid, and at that moment stirring in the mercury, which must have been previously heated to boiling, the mixture is kept fluid by a gentle heat till the combination appears to be perfect. Another method is to divide the antimony into small pieces, put it into a crucible, and add the proper quantity of mercury to fill up the interstices, the mass being then exposed to a heat little less than that required to volatilize the mercury, the whole will in a short time be formed into an amalgam.

Amalgam of Bismuth, is very readily formed by triturating that metal with mercury, in a mortar. This amalgam has the peculiar property of so attenuating tin, silver, and especially lead, when any of these metals is added to it, that a part of them passes along with the mercury through chamois leather. This experiment will succeed better, if the lead be first melted with bismuth, and the mercury added to the mixture. If this compound amalgam be digested several days, the bismuth will be separated, and the remainder will be an amalgam of lead.

Amalgam of Copper, is prepared with great difficulty in the dry way, because the heat required to fuse that metal will volatilize the mercury with explosion. The moist way is, therefore, preferable, and is thus executed: take a boiling hot saturated solution of sulphat of copper, pour it into a glass, or Wedgewood ware mortar, and add mercury and iron filings; the iron will decompose the sulphat of copper, and precipitate this latter metal in a finely divided state, which by the heat and moderate trituration will unite with the mercury, and the combination may afterwards be perfected by fusion at a gentle heat in a crucible.

This amalgam is useful as a means of refining copper, for if it be boiled in river water, and then distilled in a retort, and distilled twice by cohobation, the copper is left in the form of a new metal, of the colour of gold, and more ductile than before.

Amalgam of Gold, is produced with the utmost facility, in consequence of the high degree of affinity subsisting between that metal and mercury. Leaf gold, by simple trituration with mercury, will form an amalgam in a few minutes, and pieces of gold, though of considerable thickness, by being immersed in pure mercury will, in a few days, be wholly dissolved, even without trituration. In the great way, this amalgam is usually made by heating the laminæ or plates of that metal red hot; the mercury, being previously heated, is then poured upon them, and the mixture is stirred with a little iron rod till it begins to rise into smoke. It is then thrown into a vessel of water, where it coagulates, and becomes manageable. The proportion is about two parts of gold to one of mercury: if there be too much of the latter, the excess may be separated by filtration. The amalgam is of a white colour, and of the consistence of butter: it is much used in gilding,—the amalgam being laid or rubbed upon the metal to be gilded, it is exposed to heat, which evaporates the mercury, and leaves the gold upon the surface of the metal. Metal buttons are gilt in this manner. Goldsmiths also amalgamate their gold, for the purpose of rendering it fluid and ductile.

Amalgam of Iron. The formation of this amalgam has ever been considered as a matter of extreme difficulty; and some persons have hastily judged it to be impossible. M. Navier, however, succeeded in it by a tedious process of distillation in balnea-mariæ. Mr. Arthur Aikin has employed a simpler method, which answers very well. It consists in uniting an amalgam of zinc, with iron filings, and then adding muriat of iron. A decomposition takes place, and there is produced a muriat of zinc, and the amalgam of iron with mercury, which by kneading, and the aid of heat, assumes the metallic lustre.

Amalgam of Lead, is made by melting a proper quantity of lead in an iron crucible, and, when the metal is a little cooled, pouring to it an equal weight of clean mercury. The mixture is then to be stirred with an iron rod, and when cold, the amalgam will appear in the form of a softish brittle mass. This may be made still softer by trituration; and, if it be then put into a glass mortar, and ground, any quantity of mercury may be united to it as pleasure, and they will combine as readily as salt with water. Bismuth promotes the action of mercury upon lead in a remarkable manner. Mercury impregnated with one fourth, one eighth, one twelfth its weight of bismuth, dissolves masses of lead, in a gentle warmth, without the agitation, or triture, or comminution, or melting heat, necessary for uniting lead with pure mercury.

Amalgam of Platina, was attempted by Dr. Lewis, who hardly succeeded after a laborious

repetition of experiments for several weeks M Guyton succeeded by means of heat But a much more expeditious method has been lately discoverd by count Moussin Pouschin He took a dram of the orange-coloured salt, composed of oxide of platinum and ammonia, and triturated it with an equal weight of mercury in a mortar of chalcedony. In a few minutes the salt became brown, and afterwards acquired a greenish shade The matter was reduced to a very fine powder Another dram of mercury was added, and the trituration continued the matter became grey A third dram of mercury began to form an amalgam and six drams made the amalgam perfect The whole operation scarce lasted twenty minutes Mercury was added till it amounted to nine times the weight of the salt, and yet the amalgam continued very tenacious It was easily spread out under the pestle, it received the impression of the most delicate seals, and had a very close and brilliant grain.

Amalgam of Silver, is made in the same manner as that of gold, by heating the plates or grains of silver, and applying them red hot to the mercury, or the silver may be previously dissolved in nitrous acid (aqua fortis), and then precipitated. This amalgam has the singular property, at the common temperature, of being heavier than either of the metals of which it is composed, as was first observed by Gellert. This amalgam is much used in the operation of silvering, as that of gold is for gilding; and also in making the Arbor Dianæ, or the Philosophical Tree

Mercury is also amalgamated with silver and gold, for the purpose of separating these metals from their ores, the mercury is applied to the ore, when duly prepared to receive it, and the metals, having a less affinity for the ore than for the mercury, leave the former, and form amalgams with the latter These amalgams being exposed to heat, the mercury is driven off, and the metal remains behind This process is detailed more fully under the words ASSAYING, SMELTING, and ORES See also AMALGAMATION

Amalgam of Tin, is prepared in the same manner as that of lead, by pouring heated mercury into melted tinfoil This is much used for tinning mirrors, and enabling them to represent images more sensibly and perfectly It was formerly employed in the preparation of mercury-balls for purifying water; these were composed of four parts of tin and one of mercury, and were suspended in water, which was at the same time boiled, to purify it from extraneous matter. Mr Canton observed that a small quantity of this amalgam, with a very little chalk or whiting, being rubbed on the cushion of an electrical machine, contributed [illegible] the power of electricity [illegible] preferred for this use.

Amalgam of Zinc, [illegible] by a method similar to that employed [illegible]. It is useful in the arts where it is necessary to cover any other metal with zinc. Dr. Higgins recommends this amalgam in preference to that of tin, for the purpose of exciting electricity, and increasing the power of the machine it is now generally used with this design, by electricians

No amalgam has yet been formed with cobalt, and it is supposed that this metallic substance is incapable of uniting with mercury We are also ignorant of the manner in which mercury acts upon arsenic; no combination having been formed between them But most of the other metals, if not all of them, may be amalgamated by one or other of the methods above described; and the difficulty, or ease of the operation, will be in proportion to the cohesion of the metal and the weakness of its affinity for mercury, or the contrary

AMALGAM, in oryctology. See HYDRARGYRUM.

AMALGAMATION, the act or practice of amalgamating metals, either for the purpose of extracting them from their ores,—for purifying them, when extracted,—or for applying them more readily to their different uses in the arts In the last sense, the operation has been already treated of under the article AMALGAM. in the two former, particularly the first, it is a part of metallurgy, and as such we are now to consider it

The method of extracting the precious metals, as they are called, (i e gold and silver), from their ores, by means of amalgamation with mercury, has been known for many ages, it has been made use of from time immemorial in the streaming for gold, in order to purify and collect together the gold dust which is dispersed in the sands This process was introduced into some of the mines of Mexico, in 1550, by don Pedro Fernandez de Velasco, and in 1571, into some of those of Peru by the same person, and from thence it quickly spread through all the mines in the south and north east parts of America, insomuch that it is almost the only method used in that part of the world for extracting these metals The richer ores, however, are purified by fusion with lead, and baron Born informs us that formerly the poorer kinds of ores were certainly thrown away, and when the method of amalgation was introduced into Peru, the old barrows were searched for the ores which had been rejected as useless, but were now put to the quicksilver

The following method of extracting gold from its ores is very much recommended: "The auriferous sand, which contains gold grains and gold dust, is concentrated by washing, and without any calcination goes to the above-mentioned washing-pit, which for this purpose need not be so large. On its upper part is fixed a square launder, about twelve feet long, covered in the bottom with a woollen cloth, in order to retain any part of the gold dust which may be carried over with the water and stuff gently stirred in the pit. When the water carries off no more mud, but runs clear, the further supply is to be stopped, the water in the pit is pumped, or taken out with buckets,

the coarser sand in the bottom is separated or scraped off by hands, and the finer heaviest sand at the bottom is mixed with quicksilver Then it is squeezed through a piece of cloth, the quicksilver comes off without any gold, which separated from the sand remains as an amalgam, and is pure after the remaining quicksilver has been evaporated The sand and heavier dust remaining on the launder are washed and treated in the same manner

"The auriferous ores and loadstones, however, which rise from different mines, are calcined like silver ores, more or less as the nature of their matrices will direct Then they are ground and sifted, and the auriferous stuff, thus prepared, is put into heaps, exposed to the sunshine, and worked and turned about for three or four days It requires no salt Afterwards sulphur, and at last quicksilver, are added and mixed with it There is no occasion for fire under the vessel in which it is triturated, except in winter, and two days after, though not dried, it is immediately carried to the washing pit, and treated like the amalgam of silver

This method of extracting gold and silver is so certain and safe, that, when other methods of amalgamation extract only one ounce of gold and silver, this produces three or four from the poorest ores in a shorter space of time and with less expence

There are three ways of employing amalgamation upon gold and silver ores, according to the method practised by Alonzo Barba, viz in heaps or caxons,—in the boiler,—and in mortars

1 *In heaps* Before the operation takes place in the large way, an essay is made of three or four pounds of the fine sifted powder taken from the general quantity, and according to the produce of this he calculates that of the whole He tries it also with quicksilver, to know perfectly the method he is to follow, and the additions that are to be made In this essay the following method is adopted 1 The matter is elixated, to extract the vitriol if there be any 2 One pound of the lixiviated matter is tried with quicksilver and salt, carefully observing the colour and its change If the quicksilver assumes the appearance of silver filings, and these quicksilver flakes become thinner and thinner it proves that the amalgamation goes on successfully, and that there is no occasion for any addition The whole is stirred from time to time, till the quicksilver seems to diminish, and recover its natural form, but without dividing into small globules, after which the matter is to be washed, as all the silver is by that time completely taken up The ores of Verenguela de Pacages are treated only with quicksilver and salt, and yet yield their full produce

2 *Amalgamation by boiling*, was accidentally discovered by Barba, in an attempt to fix quicksilver —On mixing silver ore finely powdered with quicksilver, and boiling it with water in a copper vessel, he found that the metals readily united, and thus having discovered a shorter method of amalgamation, he gradually improved and introduced it into practice in Peru In this operation the boilers must be of copper, earthen or other vessels being found not to answer the copper also must be pure, because the quicksilver would dissolve the metals with which it is alloyed They must be in the shape of inverted cones, and flat-bottomed The under part has a rim of six or eight inches high and half an inch broad, all beat of one piece Other copper plates are fixed in the inside with copper nails, and care must be taken that it be water-tight, that no quicksilver may run off, and for the better security, the inside of the boiler may be lined with lime and ox-blood The boilers may be of any magnitude, their upper parts being surrounded with iron rings with strong handles, into which a cross board is wedged In the middle of this board is a hole for the spindle to move in The spindle is of light wood, and moves on a brass pivot in the bottom It has four wooden wings, with three or four perpendicular bars, also of wood, the farthest from the spindle being the shortest, the nighest so long as to sweep the bottom It is turned by a moveable handle on the upper end

These boilers are put into an oblong furnace, capable of holding ten of them, the fire place being in the middle, and the flame and smoke passing under the boilers, and going out on both ends of the furnace by two chimneys The fire being lighted, first the water, then the fine stuff, and at last the quicksilver, is put in, observing always that the bottom be fully covered with quicksilver The water must always be kept boiling, otherwise the operation may be interrupted or become tedious on account of the evaporation, the boilers must be supplied with a quantity of water, in small quantities at a time, that the boiling be not checked The stuff must be proportionate to the size of the boiler if too little be put in, the amalgamation goes on too slowly, while too much would not allow the mass to be thick enough, or to boil with sufficient freedom Some of the amalgam is to be taken out from time to time with a long ladle, and the progress of the operation is judged of by the colour The essay of the matter determines whether all the silver be taken out of it in this manner Some quicksilver is then thrown upon the surface of a sample of the boiled stuff, and worked round with it in a vessel two or three times If the quicksilver rises and takes up some of the matter, some silver remains, if not, the whole is taken up Then the fire is stopped, the spindle is taken out, and the water and matter let off The coarser matter on the quicksilver may at all events be washed in cold water, and go once more to the mill Almost the whole of the silver amalgama lies upon the surface of the quicksilver, immediately under the stuff, sometimes four or five fingers thick; the fire under the boilers preventing the silver from uniting with the quicksilver in the bottom This metal, when poured off, must be pressed and treated in the usual manner

The advantages attending this method are, 1 That the heat promotes the union of the metals, while the boiling and stirring brings them frequently into contact, so that much time is saved, and the whole process is finished in about twenty-four hours, 2 That less mercury is lost than by the common method, for being always covered with water it cannot evaporate, 3. That heaps in which, by too large additions, the mercury has been totally dissolved so as to disappear, may be easily cured by boiling them in iron or copper vessels with bits of iron, and then the mercury may be regained in its proper metallic form and brightness

3 *Amalgamation in mortars* It is difficult to procure the full produce from ores which contain native gold and silver either in the form of hair or wire, or in larger lumps and nodules These cannot be completely pounded, nor can they be amalgamated, for the mercury will not dissolve the large particles of gold and silver, and when they are treated by fire, the stubborn nature of their matrices occasions a great loss of metal The following method of treating them in a mortar was discovered by a Franciscan friar

A round conical hole is cut in a hard stone, half a foot in diameter at top, of an equal depth, and sloping into a truncated, or rather obtuse and nearly flat bottom, of about four inches in diameter Some quicksilver is poured into it, together with a proportional quantity of small bits of the native metal or ore, after which they are triturated with an iron pestle By this violent trituration, the gold and silver combine with the quicksilver, and the finer, lighter matter of red silver ore and other silver calces, which are generally found with native silver, runs off by means of a small launder and current of water It is not, however, suffered to run away, but is left to settle for common amalgamation.

Mortars of the dimensions above described being too small for any considerable quantity of ore, Barba proposes to substitute in their place larger stones of a concave figure, with vertical grinders, as in oil mills, or common horizontal and parallel grinders of the grist-mill The ore and quicksilver are put between these stones, with a small stream of water, which, running off, will carry away the lighter stuff, whilst the gold and silver will remain at the bottom, taken up by the quicksilver

When the amalgamation is completed, by whatever method, the gold or silver is separated from the mercury by pressing the amalgam through shamois leather, or through cloth, a part of the mercury is thus forced out, and the remainder may easily be disengaged by exposure to a proper degree of heat, which dissipates the mercury, while the gold or silver remains behind. When these processes take place in what is called "the great way," different machines are used to assist and expedite the operations.

[illegible] method of amalgamation is [illegible] Halsbruck and U[illegible] works, near Freyberg Count Von Beust informs us, that by this method 79,785¾ cwts of ore, which, by the common mode, would have given only 31,139 lbs 4½ oz of silver, was made to yield 38,330 lbs 2⅞ ounces, thereby gaining 1190 lbs 7⅞ oz

Gold and silver are the only metals that are extracted from their ores by amalgamation, the methods of obtaining the other metals will be found under their respective names Under the names also of gold and silver, will be given an account of the other modes employed in separating these metals from their ores The general principles of the process will be exhibited under the articles ASSAYING and SMELTING

AMALIA, in entomology A species of papilio, for the generic character of which, see PAPILIO

AMALTHÆA, daughter of Melissus king of Crete, fed Jupiter with goat's milk Hence some authors have called her a goat, and have maintained that Jupiter, to reward her kindnesses, placed her in heaven as a constellation, and gave one of her horns to the nymphs who had taken care of his infant years This horn was called the horn of plenty, and had the power to give the nymphs whatever they desired

AMALTHÆA, the name of the Cumæan Sibyl, who offered to Tarquinius Superbus nine books, containing the Roman destinies, and demanded 300 pieces of gold for them He derided her, whereupon she threw three of them into the fire, and returning, asked the same price for the other six which being denied, she burnt three more, and returned, still demanding the same price Upon which, Tarquin consulting the pontiffs, was advised to buy them These books were in such esteem, that two magistrates were created to consult them upon extraordinary occasions

AMAMA (Sixtinus), professor of the Hebrew tongue in the university of Franeker, a man of great learning, was born in Friesland, and had studied under Drusius He published a criticism upon the translation of the Pentateuch, collated the Dutch translation of the Bible with the original and the most accurate translations, and wrote a censure of the Vulgate translation of the historical books of the Old Testament, Job, the Psalms, and Canticles. It is impossible to answer the reasons whereby he shews the necessity of consulting the originals This he recommended so earnestly, that some synods, being influenced by his reasons, decreed, that none should be admitted into the ministry but such as had a competent knowledge of the Hebrew and Greek text of the Scripture He died in 1629

AMAN, a sort of blue cotton cloth, which comes from the Levant by the way of Aleppo

AMANA, one of the Bahama islands.

AMAND (St) a town of France, in the department of Cher, and late territory of Bourbonnois. Lat 46 40 N , Lon 2. 30 E.

AMAND, (St) a town of France, in the

department of the North, and late French Flanders Lat. 50 27 N Lon 3 35 E

AMARA DULCIS See DULCAMARA

AMARANTE, an order of knighthood, instituted in Sweden by queen Christina, in 1653, at an annual feast, at the close of which she threw off her habit, which was covered with diamonds, leaving it to be pulled in pieces by the masques In memory of this ridiculous scramble she founded a military order called in Swedish Ceschilschafft, into which all present at the feast were admitted, including sixteen lords and as many ladies, besides the queen Their device was the cypher of Amarante, composed of two A's, the one erect, the other inverted, and interwoven together, the whole inclosed by a laurel crown, with this motto, Dolce nella memoria

AMARANTH (Globe) See GOMPHRENA

AMARA'NTHINE. *a* 1. Consisting of amaranths 2. Unfading, never decaying

AMARANTHOIDES. See CELOSIA, and ILLECEBRUM

AMARANTHUS Amaranth, or flower-gentle A genus of the class and order monoecia pentandria, thus characterised Male, calyx three-leaved; corolless, stamens three or five Female, calyx three-leaved, corolless, styles three, capsule one seeded, opening horizontally all round, seed one. It comprises twenty-eight species; some of which are common to Europe, others to Asia, and others to America Our own wild Amaranth is the a blitum The a hypocondriacus is prince's-feather, a native of Virginia, and the a caudatus, love-lies-bleeding, of Indian origin

The a olearaceus, esculent amaranth, as well as several other Indian species, is eaten, in the east, in the same manner as cabbages among ourselves

AMARDUS, in ancient geography, a river of Media, which discharged itself into the Caspian sea

AMARITUDE *s* (*amaritudo*, Lat) Bitterness (*Harvey*)

AMARUM In oryctology, a genus of the class salts of a bitter taste, easily soluble in water, the solution becoming milky by a mixture of soda, easily melting in heat, but neither detonating nor decrepitating Six species 1 A genuinum Epsom salt Sulphat of magnesia Magnesia vitriolata (See MAGNESIA VITRIOLATA) 2 A muriaticum Found plentifully in salt waters, springs, and lakes 3 A calcareum Found in the ocean and other saline waters, and sometimes in a dry state 4 A nitrosum Nitrated calx Found mixt with soil and on old walls. 5 A murale Found generally with nitrum humosum 6 A animale Found with nitrum humosum, and composed of phosphoric acid and nitre

AMARUS. In oryctology, a genus of the class earths, order siliceous consisting of silica, a smaller proportion of magnesia, a very small quantity of alumina, and carbonat of lime, and ten per cent. of oxyd of iron : hard, tenacious, subopake, a little greasy, green, of a splintery texture, breaking into indeterminate fragments, of a common form not fusible per se One species only A amazonicus Found in the East, New Zealand, Helvetri, and Labrador mountains, and often fashioned in the East, and New Zealand, into various ornaments, vessels, and arms

AMARYLLIS Lilly-daffodil A genus of the class and order hexandria monogynia Its corol six petalled, form irregular, filament, inserted in the throat of the tube, declined, unequal in proportion or direction (See Nat Hist pl V) There are thirty-seven species, some with a one-flowered, others with a two-flowered, and others, again, with a many-flowered spathe Each of the four quarters constitutes several of these species, but the greater number are Cape plants The corols of all are exquisitely beautiful, but the A lutea, from the south of Europe, is the only one that will flourish in this country, out of our green-houses

AMASIA, in entomology, a species of Papilio, in the nymphalis section See PAPILIO

AMA'SMENT *s* (from *amass*) A heap; an accumulation, a collection (*Glanville*)

AMASONIA In botany, a genus of the class and order didynamia, angiospermia Its calyx is five-cleft, corol tubular, with a small five-cleft border, berry four-seeded. There are only two known species, the a erecta from Surinam, and the a punicea from Trinity island

To AMA'SS *v a* (*amasser*, Fr.) 1. To collect together into one heap or mass (*Atter.*). 2 To add one thing to another (*Pope*)

AMASS *s.* (*amas*, Fr) An assemblage; an accumulation (*Wotton*)

To AMA'TE *v a* (from *a* and *mate*.) To accompany; to entertain as a companion (*Spenser*)

AMATEUR, in the arts, is a foreign term, introduced, and now current amongst us, to denote a person understanding, and loving or practising, the polite arts of painting, sculpture, or architecture, without any regard to pecuniary advantage

AMATEUR, in music, is, in French, equivalent to the Italian term Dilettante, implying a lover and cultivator of music, not professionally, but for his amusement.

AMATORII (*Amatorii*, *sc* *musculi*) A term given to the muscles of the eye by which that organ is moved when ogling

AMATORIUS, in ornithology, the amorous titmouse, or parus amorosus

A'MATORY *a*. (*amatorius*, Lat.) Relating to love, causing love (*Bramhall*)

AMAUROSIS. (*Amaurosis*, *is*, f. ἀμαύρωσις, from ἀμαυρόω, *to darken*) Gutta serena. Amblyopia A total loss of sight without any visible injury to the eye, the pupil usually dilated and immoveable A genus of disease in the class locales, and order dysaesthesiae, of Cullen. It arises generally from compression of the optic nerves, amaurosis compressionis, from debility, amaurosis atonica ; from spasm, amau-

rosis spasmodica, or from poisons, amaurosis venenata

AMAUSA, pastes made of lead and crystal with various admixtures for imitating gems

AMAXOBII, a people who, according to Ptolemy, inhabited the interior parts of Scythia, in Europe

To AMAZE *v a* (from *a* and *maze*, perplexity) 1 To confuse with terrour (*Ezekiel*) 2 To put into confusion with wonder (*Smith*) 3 To put into perplexity (*Shakspeare*)

AMAZE *s* (from the verb) Astonishment confusion either of fear or wonder (*Milton*)

AMAZEDLY *ad* (from *amazed*) Confusedly with amazement (*Shakspeare*)

AMAZEDNESS *s* (from *amazed*) The state of being amazed, astonishment, wonder, confusion (*Shakspeare*)

AMAZEMENT *s* (from *amaze*) 1 Confused apprehension, extreme fear, horrour (*Shakspeare*) 2 Extreme dejection (*Milton*) 3 Height of admiration (*Waller*) 4 Astonishment, wonder at an unexpected event (*Acts*)

AMAZING *particip a* (from *amaze*) Wonderful, astonishing (*Addison*)

AMA'ZINGLY *ad* (from *amazing*) To a degree that may excite astonishment (*Watts*)

AMAZONIA, a country of South America, bounded on the north by Terra Firma and Guiana, on the east by the Atlantic Ocean and Brazil, on the south by La Plata, and on the west by Peru, 400 leagues in length, and 320 in breadth, inhabited by numerous Indian nations

AMAZONIAN *a* Something relating to, or resembling Amazons

AMAZONS, in antiquity, a nation of female warriors, who founded an empire in Asia Minor, upon the river Thermodoon, along the coasts of the Black Sea. They are said to have formed a state out of which men were excluded What commerce they had with that sex, was only with strangers, they killed all their male children, and cut off the right breast of their females, to make them more fit for the combat From which last circumstance it is, that they are supposed to take their name, viz from the privative α, and μαζος, *mamma*, "breast"

M Petit, a French physician, published a Latin dissertation in 1685, to prove that there was really a nation of Amazons, it contains abundance of curious inquiries, relating to their habit, their arms, the cities built by them, &c Others of the moderns also maintain, that their existence is sufficiently proved by the testimony of such of the historians of antiquity as are most worthy of credit, by the monuments which many of them have mentioned, and by medals, some of which are still remaining, and that there is not the least room to believe that what is said of them is fabulous It has indeed been controverted, even among the ancients, whether ever there really were such a nation as that of the Amazons, Strabo, Palephatus, and others, deny it On the contrary, Herodotus, Pausanias, Diodorus Siculus, Trogus Pompeius, Justin, Pliny, Mela, Plutarch, &c expressly assert it The question is not of sufficient consequence to need discussion here

AMAZONS (the river of), called by the Spaniards Maranon, is the greatest river in the world It received the name of Amazons, because the Spaniards who first passed through the country on its banks, having some smart skirmishes with the natives, and afterwards examining the slain, found the bodies of some women among them Orellana was the first who discovered this river, about the year 1539 The Maranon, after issuing from the lake from whence it takes its rise, in about eleven degrees of south latitude, runs towards the north to Jaen de Bracamoros, for the length of six degrees, from whence it directs its course towards the east, almost parallel to the equinoctial line, as far as the north cape, where it discharges itself into the ocean directly under the equator, by a mouth 50 or 60 leagues broad It runs from Jaen, where it begins to be navigable, thirty degrees of longitude, according to Condamine who was sent into these parts by the French king to discover the true measure of the earth This is equal to 1800 miles of 60 to a degree But if the turnings and windings are reckoned, it will then be at least 2700 miles It receives from the north and south a prodigious number of rivers, some of which run 1500 miles, and are not inferior to the Danube or Nile The country through which this river runs is very little known to the Europeans

AMBA, an Abyssinian or Ethiopic word, signifying a rock As amba dorho, the rock of a hen, &c

AMBACHI, in topography, denotes a district of jurisdiction or territory, the possessor of which has the administration of justice, both in alto and basso

AMBA'GES *s* (Lat) A circuit of words, a multiplicity of words (*Locke*)

AMBAGIOUS *a* (from *ambages*) Circumlocutory, perplexed tedious

AMBARVALIA, processions round the ploughed fields, in honour of Ceres the goddess of corn, celebrated by the Romans, one about the month of April, the other in July They went three times round their fields crowned with oak leaves, singing hymns to Ceres, and entreating her to preserve their corn The word is derived ab ambiendis arvis, i e going round the fields A sow, a sheep, and a bull, called ambarvaliae hostiae, were afterwards immolated, and the sacrifice has sometimes been called suovetaurilia, from sus, ovis, and taurus

AMBASSADOR, or AMBASSADOUR, one who is sent in a public character from one sovereign to another The word is derived from the low Latin, ambasciator Ambassadors are either ordinary or extraordinary

AMBASSADOR ORDINARY, is one residing at another court for keeping up a good intelligence between the two powers, taking care of the interest of his master, and negociating such affairs as may occasionally happen.

AMBASSADOR EXTRAORDINARY, is a person sent to the court of a foreign power, on

some particular emergent and pressing affair, as to conclude a peace, or a marriage, make a compliment, &c. There is no essential difference between ambassadors ordinary and extraordinary, the motive of their embassies alone distinguishes them: they are equally entitled to the privileges given to ambassadors by the law of nations. Till within these two centuries, all ambassadors were extraordinary, and retired as soon as they had finished the affair they were sent to negociate.

The name of ambassador, says Cicero, is sacred and inviolable. And this has always been the opinion of all nations, for we find that David thought the affront offered to his ambassadors, a sufficient reason for making war against the Ammonites, and Alexander put the inhabitants of Tyre to the sword for insulting his ambassadors. It must be observed, though, that ambassadors cannot be defended when they commit any thing against that state, or the person of the prince, with whom they reside, and if they are guilty of treason, felony, &c. or any other crime against the law of nations, they lose the privilege of an ambassador, and may be subject to punishment as private aliens.

AMBASSADRESS. s. (*ambassadrice*, Fr.) 1. The lady of an ambassadour. 2. A woman sent on a message. (*Rowe*.)

AMBASSAGE. s. (from *ambassadour*.) An embassy. (*Bacon*.)

AMBER (from the Arabic *amir*, princely, noble, from its beautiful colour.) ἤλεκτρον, Gr. *Succinum*, Lat. *Ambre jaune*, Fr. a bituminous substance, of which there are several varieties distinguished by their colour, contexture, transparency, or opacity. The colour of amber is generally some shade of red or yellow and is always found in detached pieces. Its consistency is nearly equal to certain stones, and its fracture is conchoidal. It is commonly transparent, and when rubbed becomes capable of attracting straws, hairs, and other light substances, whence, in allusion to its Greek name, the word electricity is derived. It is often found to contain insects and leaves in high preservation, which proves that it has been in a liquid state, and in that state has enclosed those bodies. When applied to a lighted candle, it takes fire, swells, and exhales a pungent white smoke. It is distinguished from copal and honey-stone, with which it is sometimes confounded, by being harder than the former, and not melting, like it, into drops, when inflamed, and by having stronger electrical properties than the latter, from which it also differs in not becoming white when laid upon a hot coal. The specific gravity of amber varies from 1.065 to 1.1.

The only proper mines of this substance that are as yet known, are in ducal Prussia, near the sea-coast, in which the amber is found imbedded in a stratum of fossil or carbonated wood. The mines are worked in the usual way by shafts and galleries, to the depth of a hundred feet. Amber is also found along the whole shore of the German sea, and on the south coast of the Baltic. The projecting eastern shore of England too, and the coast at the entrance of the Channel from the north, affords many specimens. It is frequently thrown on the shores of Yorkshire, and fine specimens have been found in the clay-pits between Tyburn and Kensington gravel pits, and that behind St. George's Hospital at Hyde park corner.

Formerly, amber was in much request as an ornament, and its value on this account, induced many attempts to be made for the purpose of increasing its beauty. There are two methods which have been generally employed, to render opaque amber transparent: first, by surrounding it with sand in an iron pot, and cementing it with a gentle heat for about forty hours, and, secondly, which was the most usual method, by digesting and boiling the amber about twenty hours with rapeseed oil, which renders it both harder and clearer. The value of amber depending upon its size, numerous unsuccessful attempts have been made to solder together, or melt down, several small pieces so as to convert them into one large piece: Fourcroy, however, asserts that two pieces of this substance may be joined together, by dipping them in a solution of potash, heating them, and applying them to each other. Though the use of amber, as an ornament, is superseded among us by the introduction of diamonds and cut stones, it is much used for this purpose in Turkey, and the East, where it is still highly valued. Wallerius says, that the most transparent pieces may be used for microscopes, burning glasses, prisms, &c., and it has been said that the late king of Prussia had an amber burning glass one foot in diameter.

The chemical properties of amber have been hitherto but little examined. Few menstrua will dissolve it without in some degree altering its nature. When exposed to dry distillation in a glass retort, it melts and swells greatly, and gives out at first a watery acid liquor smelling strongly of amber, then a concrete acid salt which crystallizes in yellowish needles in the neck of the retort. This is the acid of amber, or the succinic acid, as it is now termed, under which latter article its chief properties are pointed out. After the acid there passes a light-coloured odorant oil, called the oil of amber, which, as the distillation goes on, becomes of a darker colour and thicker consistence, a small quantity of the acid also rises at the same time. When all the volatile parts are thus separated there remains in the retort a spongy shining coal, intensely black, which is the basis of the fine black varnish, so much used in the arts. The oil is afterwards rectified by distillation with water, when only the light, fragrant, colourless part comes over. This oil, combined with ammonia, forms Eau de Luce, which is prepared by pouring a few drops of oil of amber into a phial full of caustic ammoniac, and shaking the mixture till it assumes a milk-white colour. The use of this compound as a stimulant and restorative in

fainting fits, is well known The oil of amber will also dissolve sulphur by the heat of a sand-bath, thus composing a medicine called succinated balsam of sulphur See BALSAM

The oil, as well as other preparations of amber, are much used in medicine against spasmodic diseases For the rest, see SUCCINUM

AMBER, ACID OF See SUCCINIC ACID

AMBER, BLACK Gagates See JET

AMBER OF SODOM See ASPHALTUS

AMBER TREE See ANTHROSPERMUM

AMBERBOI See CENTAUREA

AMBERG, the capital of the Upper Palatinate of Bavaria, in Germany, defended by a strong castle Lat 49 30 N Lon 12 7 E

AMBERGRIS, AMBERGREASE, or GREY AMBER, AMBRA, an inflammable substance, of doubtful origin Its colour is grey, brown, or yellowish brown, spotted with black, its hardness and consistence are those of wax, its specific gravity from 780 to 926 so that it swims both in water and alcohol, its fracture is earthy and rugged, and exhibits bones of fish or beaks of birds, it has scarcely any particular taste, and unless heated, or much handled, very little smell, but in such circumstances its odour is very fragrant, resembling that of burning amber, and to most persons agreeable It softens between the fingers, melts in a small degree of heat like wax, inflames in a stronger heat, and if pure leaves no residuum, cold water has no effect upon it, but to boiling water it communicates its smell, and being partially melted, falls to pieces It is scarcely affected by spirit of wine, or fat oils, the former dissolves it with the assistance of heat, if the quantity of spirit be twelve times that of the ambergris, by the essential oils, as that of turpentine, it is dissolved almost entirely, and by ether most perfectly It has been found soluble in caustic fixed alkalies, still more so in sulphuric acid, and precipitable by water. When distilled, it yields an aqueous phlegm, a brown-coloured acidulous spirit, a deeper-coloured oil, a thick balsam, and, as some say, a volatile salt, leaving a black shining residuum The spirit, oil, balsam, and salt, are similar to those obtained from amber, but the oil is of a more grateful smell Its chemical products resemble those of bitumens, among which it has been ranked,

Ambergris, in a medical view, is stomachic, cordial, and antispasmodic It is used in doses of several grains, in certain drinks, or mixed in other substances. The odoriferous principle of this medicine is often too active, too penetrating, and liable to do harm It is well known that many persons cannot bear the smell of it without feeling their nerves very disagreeably affected; it should therefore be administered very cautiously. It enters into the composition of many cordial, sudorific, and alexiterial waters; but its chief virtue consists in its antispasmodic and sedative qualities, and its power of relieving certain hysterical, convulsive, and other nervous affections.

In Asia, and part of Africa, ambergris is used not only as a perfume and a medicine, but as an article of cookery; in which it is added to dishes in lieu of all-spice A great quantity of it is bought by the Mecca pilgrims, probably to use it for the purpose of fumigation and sacrifice, as the catholics use frankincense With us its use is chiefly confined to perfumers, who melt it over a gentle fire, and make extracts, essences, and tinctures of it, they also use it to scent pillows, candles, balls, bottles, gloves, and hair-powder

As ambergris is very dear, it is counterfeited and mixed with different substances It may be known to be genuine by its fragrant scent, when a hot needle or pin is thrust into it, and its melting like fat, of a uniform consistence, it swims also on water, when pure, and does not stick to hot iron The counterfeit will not yield such a smell, nor prove of such a fat texture

It is remarkable that this substance, which is the most sweet of all the perfumes, should be capable of being imitated in smell, by the preparation of one of the most odious of all fetid substances M Homberg found that a vessel in which he had made a long digestion of the human fæces, acquired a very strong and perfect smell of ambergris, insomuch that any one would have thought a great quantity of essence of ambergris had been made in it The perfume was so strong and offensive, that the vessel was forced to be removed out of the laboratory

Respecting the origin of ambergris, the opinions of philosophers have long been divided By many it has been considered as a bitumen, a sort of petroleum issuing from the rocks, and condensed by the action of the sun and the water of the sea Others have imagined it to be made up of the excrements of birds nourished on odoriferous herbs, and by some it has been taken for a sea mushroom, torn up from the bottom by the violence of tempests Others, again, have ascribed its origin to the froth thrown out by sea calves, the excrements of the crocodile, &c Pommet and Lemery thought it a mixture of wax and honey, hardened by the action of the sun, and altered by the sea water M Formey, who has adopted this opinion, supports it by an experiment which consists in digesting wax and honey he asserts, that a product may thus be formed, of an agreeable smell, nearly the same with that of ambergris Some authors have considered ambergris as an animal juice, deposited in bags situated near the root of the genital organ in the male whale, and others have imagined that it is formed in the bladder of that cetaceous animal but the nebs of cuttle-fishes found in this concrete juice, are sufficient to confute these opinions The most probable opinion, and which has of late obtained the most general admission, is that of Dr. Schwediaur, who, after examining a great many specimens of this substance, and receiving accounts concerning it from different navigators, has concluded it to be formed in the alimentary canal of the physeter macrocephalus,

or spermaceti whale He considers ambergris as an excrement of this cetaceous animal, mixed with some parts of its food 1 Because fishermen find it in these whales, 2 Because it is common in the latitudes which they inhabit, 3 Because beaks of the cuttle-fish with eight feet, sepia octopoda, on which that animal lives, are always found in it, 4 Because he distinguished the black spots mixed through ambergris to be the nebs of this polypous animal, Lastly, because the excrements of several quadrupeds, as cows, hogs, &c exhale an odour similar to that of ambergris, when kept for any length of time This opinion of Dr Schwediaur's respecting the origin of ambergris, though not exclusively his own, has derived considerable probability from his researches, and has likewise received confirmation from those of Alexander Champion, esq a principal merchant concerned in the southern whale-fishery, and of the captain of a ship, employed by him, in the said fishery See AMBRA

A'MBIENT *a* (*ambiens*, Lat) Surrounding, encompassing, investing (*Newton*)

AMBIDEXTER *s* (Latin) 1 A man who has equally the use of both his hands (*Brown*) 2 A man who is equally ready to act on either side, in party disputes

AMBIDEXTERITY *s* (from *ambidexter*) 1 The quality of being able equally to use both hands 2 Double dealing

AMBIDEXTROUS *a* (from *ambidexter*, Latin) 1 Having, with equal facility, the use of either hand (*Brown*) 2 Double dealing, practising on both sides (*L Estrange*)

AMBIDEXTROUSNESS *s* (from *ambidextrous*) The quality of being ambidextrous

AMBIGENÆ OVES, in the heathen sacrifices, an appellation given to such ewes as, having brought forth twins, were sacrificed with their two lambs, one on each side

AMBIGENAL HYPERBOLA, a name given by sir Isaac Newton, in his Enumeratio Linearum Tertii Ordinis, to one of the triple hyperbolas of the second order, having one of its infinite legs falling within an angle formed by the asymptotes, and the other without that angle

AMBIGU *s* (French) An entertainment consisting of a medley of dishes (*King*)

AMBIGUITY *s* (from *ambiguous*) Doubtfulness of meaning, uncertainty of signification, double meaning (*South*)

AMBI'GUOUS *a* (*ambiguus*, Latin) 1 Doubtful, having two meanings (*Clarendon*) 2. Using doubtful expressions (*Dryden*)

AMBI'GUOUSLY *ad* (from *ambiguous*) In an ambiguous manner, doubtfully.

AMBIGUOUSNESS *s* (from *ambiguous*) Uncertainty of meaning, duplicity of signification.

AMBI'LOQUOUS *a* (from *ambo* and *loquor*, Lat.) Using ambiguous expressions

AMBI'LOQUY *s.* (*ambiloquium*, Lat) Discourse of doubtful meaning

AMBIT, the compass, circuit, or perimeter of any thing.

AMBIT, *ambitus*, was particularly used, in antiquity, to denote a space of ground to be left vacant betwixt one building and another By the laws of the Twelve Tables, houses were not to be built contiguous, but an ambit, or space of two feet and a half, was to be left about each, for fear of fire

AMBI'TION, in ethics, is the passion which prompts men to value or to seek any kind of eminence or distinction, as well as to avoid degradation and reproach It is a kind of compound of admiration and desire, and becomes either a virtue or a vice, honourable or disgraceful, useful or pernicious, according to its direction or degree The opinions of others concerning us, when expressed by words or actions, are principal sources of happiness or misery The pleasures of this kind are usually referred to the head of honour, the pains to that of shame, but as it is most convenient to have a single word, to which to refer both pleasure and pain of this class, Dr Hartley selects ambition for this purpose He classes the several particulars which persons, under the influence of ambition, wish to have known to others, or concealed from them, in order to obtain praise or dispraise, under four heads, viz external advantages or disadvantages, of which the principal are fine clothes, riches, titles, and high birth, with their opposites, rags, poverty, obscurity, and low birth, bodily perfections and imperfections, of which the chief are beauty, strength, and health on the one hand, and on the other, deformity, imbecility unfitting a person for the offices of life, and disease, intellectual accomplishments or defects, such as sagacity, memory, invention, wit, learning, and their opposites, folly, dulness, and ignorance, and moral qualities, i e virtue or vice This ingenious writer investigates, in conformity to his proposed theory, the associations by which the pleasures and pains of ambition are produced Observations on Man, § 2 prop 95 p 443 vol 1 edit 1801.

AMBI'TIOUS *a* (*ambitiosus*, Lat.) Seized or touched with ambition, desirous of advancement, aspiring (*Arbuthnot*)

AMBI'TIOUSLY *ad* (from *ambitious*) With eagerness of advancement or preference (*Dryden*)

AMBITIOUSNESS *s.* The quality of being ambitious

A'MBITUDE *s* (*ambio*, Lat) Compass, circuit, circumference

AMBITUS, in Roman antiquity, the setting up for some magistracy or office, and formally going round the city to solicit the interest and votes of the people Ambitus differed from ambition, as the former lies in the act, the latter in the mind Ambitus was of two kinds, one lawful, the other unlawful. The first, called also ambitus popularis, was when a person offered his service to the republic frankly, leaving it to every body to judge of his pretensions as they found reasonable The second kind was that wherein force, cajoling, money, or other improper influence was made use of: this was severely punished

AMBITUS, in music, is sometimes, though seldom, used to signify the particular extent of each tone, as to gravity or acuteness

To A'MBLE *v a* (*ambler*, Fr *ambulo*, Lat.) 1 In horsemanship, to move upon an amble, to pace 2 To move easily (*Shaks*) 3 To move with submission (*Rowe*) 4 To walk daintily and affectedly (*Shaks*)

AMBLE, in the manege, a peculiar kind of pace, in which a horse's two legs of the same side move at the same time

A'MBLER *s* (from *to amble*) A pacer

AMBLINGLY *ad* (from *ambling*) With an ambling movement

AMBLESIDE, a town of Westmoreland, having a market on Wednesday Lat 54 28 N Lon 3 6 W

AMBLETEUSE, a sea-port town of France, in the English channel, in the department of the Straits of Calais one league and a half N Boulogne At this port, then called Ambletoniensis Portus, Cæsar embarked his cavalry when he passed over to England

AMBLOSIS (*amblosis*, αμβλωσις, from αμβλοω, *to cause abortion*) A miscarriage In Cullen, a species of the genus menorrhagia

AMBLOTICA (*amblotica, sc medicamenta*, αμβλωτικα, from αμβλοω, *to cause abortion*) Medicines which were supposed to occasion abortion

AMBLYGON, AMBLYGONAL, in geometry, obtuse-angled

AMBLYOPIA (*amblyopia*, from αμβλυς, *dull*, and ωψ, *an eye*) A debility or dulness of sight An incipient amaurosis

AMBO, or AMBON, a kind of pulpit or desk, in the ancient churches, where the priests and deacons stood to read or sing part of the service, and preach to the people, called also Analogium The term is derived from αναβαινειν, to mount. The ambo was mounted upon two sides, whence some also derive the appellation from the Latin ambo, both Besides the gospel, which was read at the top of the ambo, and the epistle, which was read a step lower, they likewise published from this place the acts of the martyrs, the commemoration of departed saints, and the letters of peace and communion sent by one church to another

AMBOES, in geography, a people of Lower Guinea, in Africa

AMBOYNA, one of the Molucca Islands in the East Indies. It is the chief of the Spice Islands, and remarkable for the quantity of cloves and nutmegs it produces The inhabitants of Amboyna are computed at about 80,000. Lat 4 0 S Lon 127 0 E

AMBRA. In oryctology Ambergris A genus of the class inflammables, of which there is but one species, though this species admits of several varieties We have already described it under the article AMBERGRIS, which see

AMBRACIA, in ancient geography, was one of the most considerable cities of Epirus, and situated in the territory of Thesprotia near the mouth of the river Arethon, and the gulf to which it gave its name It is now reduced to a small place of Turkey in Europe called Ambrachia, on the lower part of the gulf of Larta in the southern Albania

AMBREADA, the fictitious amber which the Europeans use in trading with the negroes on the African coast

AMBRESBURY, a town in Wiltshire, with a market on Friday It is six miles N of Salisbury Lat 51 11 N Lon 1 40 W Not far from hence is that celebrated monument of antiquity, Stonehenge

AMBRONES, in ancient geography, a people of Gaul, who had possession to the north and south of the Po See Plutarch in Marco

AMBROSE (St), bishop of Milan, was born in Gaul, about 340 His father was præfect of Gaul, and gave his son an excellent education His eloquence as a pleader procured for him the governorship of Liguria and Æmilia, on which account he settled at Milan On the death of Auxentius, bishop of Milan, in 374, a contest arose between the Arians and Catholics, about electing a successor The tumult in the church was so great, that Ambrose found it necessary to go thither to restore peace While he was speaking to the people, a child cried out, "Ambrose is bishop This seeming to be the direction of heaven, the people were determined to act upon it, and all the endeavours of the governor proved fruitless to get them to elect another person He was accordingly baptized, being only a catechumen before, and then consecrated In 383, he was sent by the emperor Valentinian to the tyrant Maximus, and prevailed upon him not to enter Italy About the same time the heathens endeavoured to restore their religion, for which purpose they employed Symmachus præfect of Rome, to plead their cause, in which he was baffled by Ambrose, who also experienced some trouble from the Arians The empress Justina was of that sect, and demanded of him the Portian church at Milan for the Arians, which he stoutly refused He was sent again to Maximus, but notwithstanding his eloquence, the tyrant entered Italy, and made himself master of the western empire, and entered Milan in triumph Valentinian and his family sought refuge with Theodosius, who in his turn defeated Maximus, and restored the fugitive monarch to his throne While Theodosius staid in Italy, an insurrection happened in Thessalonica, in which the emperor's lieutenant was slain Theodosius, to revenge this riot, put to death a vast number of persons in cool blood Soon after this massacre he came to Milan, and was about to enter the great church, when he was met at the door by Ambrose, who refused him admittance as a homicide Theodosius returned to his palace in great distress of mind, and it was not till a year afterwards, and his shewing tokens of repentance, that the prelate would admit him to christian communion. Ambrose died at Milan, in 397, and was buried in the great church of that city. His writings were published in two vols, folio, at Paris, in 1686 and 1690. He

composed the noble hymn, "Te Deum Laudamus" (*Watkins*)

AMBROSE (Isaac), an eminent presbyterian minister, was educated at Brazen-nose college, Oxford, where he took the degree of bachelor of arts, and became minister of Preston, and afterwards of Garstang, in Lancashire, where he was in 1662 ejected for non conformity It was usual with him to retire every year for a month into a little hut in a wood; where he shunned all society, and devoted himself to religious contemplation Dr Calamy observes, that he had a very strong impulse on his mind of the approach of death, and took a formal leave of his friends at his house, a little before his departure, and the last night of his life he sent his discourse concerning angels to the press The next day he shut himself up in his parlour to the great surprise and regret of all who saw him, he was found just expiring He died in 1663-4, in the seventy-second year of his age He wrote several other books, as the Prima, Media, and Ultima, or the First, Middle, and Last Things, War with Devils, Looking upon Jesus, &c

AMBROSE, or ST AMBROSE IN THE WOOD, an order of religious, who use the Ambrosian office, and wear an image of that saint engraven on a little plate in other respects, they conform to the rule of the Augustins.

AMBROSE ISLAND, an island on the coast of Chili, 15 miles W from St Felix Island The crew of captain Roberts in 1792, killed and cured here 13,000 seal skins in seven weeks Lat 26 13 S Lon 80 55 W

AMBROSIA (from α and βροτος, *immortal*) In heathen antiquity denotes the solid food of the gods, in contradistinction from their drink, which was called nectar

AMBROSIA is also a pompous kind of title, given by the old physicians to certain alexipharmic compositions A famous antidote of Philip of Macedon, against all poisons, bites, and stings of venomous creatures, was also called by this name

AMBROSIA In botany a genus of the class and order monœcia, pentandria Male —calyx common, one leafed; florets one-petalled, funnel-form, three cleft, receptacle naked Female —calyx one leafed one-flowered, corolless nut one-seeded, crowned with the five teeth of the hardened calyx There are five species, chiefly natives of North America

AMBRO'SIAL *a* (from *ambrosia*) Partaking of the nature or qualities of ambrosia, fragrant, delicious, delectable (*Pope*)

AMBRO'SINIA In botany a genus of the class and order monœcia polyandria Spathe one-leafed, separated by a membranaceous partition, containing the stamens in the hinder cell and upper part of the partition; pistils in the outer cell and lower part of the partition The only known species is a Sicilian plant with a tuberose root

A'MBRY *s* (corrupted from *almonry*) 1 The place where alms are distributed 2 The place where plate, and utensils for housekeeping, are kept.

AMBS ACE *s* (from *ambo*, Lat and *ace*) A double ace (*Bramhall*)

AMBUBAJÆ, in Roman antiquity immodest Syrian women, who came to Rome, and lived chiefly upon prostitution, and selling paint for the face

AMBUBEIA, in botany, a name given, by some authors, to wild succory

AMBULA'TION *s* (*ambulatio*, Lat) The act of walking (*Brown*)

A'MBULATORY *a* (*ambulo*, Latin) 1 That which has the power or faculty of walking (*Wilkins*) 2 That which happens during a passage or walk (*Wotton*) 3 Moveable, shifting place 4 This word is applied to the feet of birds, when the toes are placed three behind and one before

AMBURBIUM or AMBURBIALE SACRUM, in antiquity, a religious feast, or ceremony, practised among the Romans wherein they made processions around their city, in order to avert some calamity

AMBURY, among farriers, a name given to a tumour, wart, or swelling on the body of a horse, soft to the touch, and full of blood This is cured by tying a horse-hair very tightly about its root, which causes the whole to rot and fall off, then verdigris is strewed upon the part to prevent a return of the complaint If the tumour be very small, it is best to reduce it by means of caustics

AMBUSCA'DE *s* (*embuscade* Fr) A private station in which men lie to surprise others ambush (*Addison*)

AMBUSCA'DO *s* (*embascada*, Span) A private post in order to surprise (*Shaks*)

A'MBUSH *s* (*embusche*, Fr) 1 The post where soldiers or assassins are placed, in order to fall unexpectedly upon an enemy (*Dryden*) 2 The act of surprising another, by lying in wait (*Milton*) 3 The state of lying in wait (*Hayward*) 4 The persons placed in private stations (*Shaks*)

A'MBUSHED *a* (from *ambush*) Placed in ambush, lying in wait (*Dryden*)

A'MBUSHMENT *s* (from *ambush*) Ambush, surprise not used (*Spenser*)

AMBU'ST *a* (*ambustus*, Lat) Burnt, scalded

AMBUSTA a term used in surgery for a solution of continuity, caused by the application of heated substances

AMBU'STION *s* (*ambustio*, Lat) A burn a scald

AME, a musical term used by the French to denote feeling and expression

AMEDIANS, in church history, a congregation of religious in Italy, so called from their professing themselves amantes Deum, lovers of God, or rather amati Deo, beloved of God. They wore a grey habit and wooden shoes, had no breeches, and girt themselves with a cord They had twenty-eight convents

AMEIVA, in zoology, a species of Lacerta having a verticillated long tail, thirty abdominal scales, and a kind of collar consisting of a double wrinkle beneath This creature is principally found in South America

AMEL s. (email, Fr.) The matter with which the variegated works are overlaid, which we call enamelled (*Boyle*).

AMELIORATION. s. (from the French *ameliorer*, to improve.) Improvement. Hence we have

AMELIORATING SUBSTANCES, in agriculture, such, either animal or vegetable, as, when applied to land, improve it, that is, render it more fertile and productive.

AMELLOIDES, in botany. See CINERARIA.

AMELLUS. In botany, a genus of the class and order syngenesia polygamia superflua: thus generically distinguished: receptacle chaffy, down simple, calyx imbricate, florets of the ray undivided. It contains three species, all exotic to our own country.

AMELLUS OF VIRGIL. See ASTER.

AMEN (אמן, Heb. signifies *true*, *faithful*, *certain*.) It is made use of likewise to affirm any thing, and was a sort of affirmation used often by our Saviour: Αμην, Αμην, λεγω υμιν, i. e. Verily, verily, I say unto you. Lastly, it is understood as expressing a wish, as Amen, So be it! Numb. v. 22. or an affirmation, Amen, yes I believe it, 1 Cor. xiv. 16. The Hebrews, and the five books of Psalms, according to their way of distributing them, with the words Amen, amen; which the Septuagint have translated, γενοιτο, γενοιτο, and the Latins, Fiat, fiat. The Greek and Latin churches have preserved this word in their prayers, as well as alleluiah and hosannah, because they observed more energy in them than in any terms which they could use in their own languages.

AME'NABLE. a. (amesnable, French.) Responsible; subject so as to be liable to inquiries or accounts (*Davies*).

A'MENANCE. s. (from *amener*, French.) Conduct; behaviour: obsolete (*Spenser*).

To AME'ND. v. a. (amender, French.) 1. To correct; to change any thing that is wrong to something better. 2. To reform the life (*Jeremiah*). 3. To restore passages in writers which the copiers are supposed to have depraved.

To AME'ND. v. n. To grow better (*Sidney*).

AME'NDE. s. (French.) A fine, by which recompence is supposed to be made for the fault committed.

AMENDE HONORABLE, a kind of punishment heretofore inflicted in France upon traitors, parricides, or sacrilegious persons, in the following manner. The offender being delivered into the hands of the hangman, his shirt stripped off, a rope put about his neck, and a taper in his hand, was then led into court, where he must beg pardon of God, the king, the court, and his country.

AMENDER. s. (from amend.) The person that amends any thing.

AMENDMENT. s. (amendement, Fr.) 1. A change from bad for the better (*Ray*). 2. Reformation of life (*Hooker*). 3. Recovery of health (*Shakspeare*).

AMENDMENT, in law, the correction of an error committed in a process, and discovered before judgment. If the error be committed in giving judgment, viz. if a wrong judgment be given, there they cannot amend it, but the party aggrieved must bring his writ of error.—However, where the fault appears to be in the clerk who writ the record, it may be amended, chiefly if it be in matter of fact, not in point of law.

AMENDMENT OF BILLS IN PARLIAMENT, means some alteration made in the original draught; and we read of amendments of amendments, amendments of returns of representatives, &c.

AME'NDS. s. (amende, Fr.) Recompence, compensation, atonement (*Raleigh*).

AME'NITY. s. (amenité, Fr. *amœnitas*, Lat.) Agreeableness of situation (*Browne*).

AMENORRHŒA. (*amenorrhœa*, from α, priv. μηνιαιος, *monthly*, and ρεω, *fluo*.) A total obstruction of the menses from other causes than pregnancy. Dr. Cullen places this genus in the class locales, and order epischeses. His species are, 1. Emansio mensium, that is, when the menses do not appear so early as is usually expected. 2. Suppressio mensium, when, after the menses appearing and continuing as usual for some time, they cease without pregnancy occurring. 3. Amenorrhœa difficilis, vel Menorrhagia difficilis, when this flux is too small in quantity, and attended with great pain, &c. As the opposite term menorrhœa is never used in medicine to express natural menstruation, but catamenia, it would be more scientific to exchange amenorrhœa for acatamenia, and to denominate the amenorrhœa difficilis of Cullen dyscatamenia.

AMENT (*amentum*.) In botany. Called by others julus, nucamentum, catulus. In English, catkin, from the French chaton, on account of its resemblance to a cat's tail.—Amentum, gemmaceum, imbricatum, commune s. Inflorescentia, ex receptaculo communi paleaceo gemmaceo. A species of calyx, or rather of inflorescence, from a common, chaffy, gemmaceous receptacle: or, consisting of many chaffy scales, ranged along a stalk slender as a thread, which is the common receptacle.—In the class monœcia, the male flowers are frequently thus disposed, as in hazle, birch, oak, walnut, sedge, &c. also in willow, poplar, &c. in the class diœcia. The ament of the willow in vulgar language is called a palm.

AMENTA'CEÆ. The name of the sixteenth order in Linnéus's Fragments of a Natural Method, in Philosophia Botanica, and of the fiftieth at the end of Genera Plantarum: also, of a class in Tournefort's, Boerhaave's, and Royen's Systems.

AMENTA'CEOUS. a. (*amentatus*, Lat.) Hanging as by a thread (*Miller*).

AMENTACEOUS FLOWERS. One species of the aggregate, borne or growing in an ament or catkin.

AME'NTIA (*amentia*, from α, priv. and *mens*, the mind.) Imbecility of intellect, by which the relations of things are either not perceived, or not recollected. A disease in the class neuroses, and order vesaniæ of Cullen.

When it originates at birth it is called amentia congenita, when from the infirmities of age, amentia senilis, and when from some accidental cause, amentia acquisita

AMENTUM, in Roman antiquity, a thong tied about the middle of a javelin, and fastened to the fore finger, in order to recover the weapon as soon as it was discharged

AMER (Bitter), the name given by C Welter to a detonating and crystallisable substance obtained by him from treating silk with the nitric acid, for the purpose of procuring oxalic acid

On one part of silk, he poured six parts of nitrous acid of the shops, adding a little concentrated nitric acid After it had rested two days he distilled this mixture He then poured what had passed into the receiver on what remained in the retort, and filtred the whole The oxalic acid crystallizing on the filtre, he put the whole again into the retort, and added a pretty large quantity of water, which had served to wash the filtre. He distilled off a part of the water, but as the residuum did not crystallize, returned, by elevating the receiver, what had passed over, and after repeating this operation several times, obtained for residuum an acid yellow liquor of the weight of the silk employed, and which contained small granulated crystals This liquor, which shewed no traces of the oxalic acid, was then saturated with lime, and concentrated Alcohol was then added, which, having taken up a matter of a gummy appearance, was evaporated, when there remained a yellow substance mixed with solutions of the nitrat and muriat of lime These salts were decomposed by carbonat of potash, and the liquor, separated from the carbonat of lime, was subjected to evaporation, which gave golden-coloured crystals, as fine as silk, detonating like gunpowder and producing a black smoke These crystals, which appear to be of an octahedral form, constitute the substance which Welter has denominated amer Its properties are not very accurately known, as no other person has made any experiments upon it, and his were not repeated It appears, however, from what has been observed, that amer is soluble in water and alcohol, and is deprived of its colour by the oxygenated muriatic acid, that the sulphuric acid disengages from it the odour of the nitric acid, and that muriatic acid precipitates from its solution, small micaceous, whitish, volatile crystals, which in the fire exhale a bitter and inflammable smoke

Sponge and raw beef were also treated with nitric acid by Welter, who obtained from the first a colourless substance, soluble in concentrated nitric acid, and precipitable from it by water, and from the latter a substance which appeared to be compounded of that afforded by sponge, and the amer obtained from silk This combination, soluble also in concentrated nitric acid, may be separated from it by water under the form of a yellow powder, which does not lose its colour by exposure to the air, and which Welter supposes might be useful in painting

To AMERCE v a (amercier Fr) To punish with a fine or penalty (*Milton*)

AMERCEMENT, or AMERCIAMENT, in law, a pecuniary punishment imposed on offenders at the mercy of the court It differs from a fine in being imposed arbitrarily, in proportion to the fault, whereas a fine is a certain punishment settled expressly by some statute

AMERCER s (from *amerce*) He that sets a fine upon any misdemeanor

AMERI, in botany See INDIGOFERA

AMERICA (from *Americus Vespucius*, falsely said to be the first discoverer of this continent) One of the four parts of the world, and by much the largest It is bounded on all sides by the ocean, as appears from the latest discoveries, it being formerly supposed to join to the north-east part of Asia Americus Vespucius, from whom it took its name, was a Florentine, who having accompanied Ojeda, an enterprising Spanish adventurer, to America, and drawn up an amusing history of his voyage, published it, and it was read with admiration In his narrative, he had insinuated, that the glory of having first discovered the continent of the new world belonged to him This was in part believed, the country began to be called after the name of its supposed first discoverer, and the unaccountable caprice of mankind has perpetuated the error, though there is no doubt that not merely Columbus, but Behaim, and Cabot, had visited America many years before Vespucius (See BEHAIM, &c) Many are the conjectures about the peopling of this vast continent, but we cannot relate them here nor indeed is it greatly to be wished America is so long, that it takes in not only all the Torrid, but also the Temperate and part of the Frigid Zones It is hard to say how many different languages there are in America, a vast number being spoken by the different people in different parts, and as to religion, there is no giving any tolerable account of it in general, though some of the most civilized of the aborigines seem to have worshipped the sun The principal motive of the Spaniards in sending so many colonies here was the thirst of gold; and indeed they and the Portuguese are possessed of all those parts where it is found in the greatest plenty This vast continent is divided into N. and S America, which are joined by the isthmus of Darien It has the loftiest mountains in the world, such as those that form the immense chain called the Andes, and the most stupendous river, such as the river Amazon ("the mighty Orellana"), the "sea-like Plata, the Oronoko, the Mississippi, the Illinois, the Missaures, the Ohio, the St. Lawrence, the Hudson, the Delaware, the Susquehannah, the Potomac, &c. Besides the aborigines, who inhabit the interior parts and the United States of America, who possess some of the finest provinces that formerly belonged to Great Britain, the different European powers have rich and flourishing colonies here The American States are fifteen in number, each having a separate local government, but they are formed into one federal republic These

states long flourished as provinces of Great Britain, but parliament attempting to tax them by its sole authority without the intervention of their assemblies a civil war ensued, a congress was formed, which, in 1776, disclaimed all dependence on the mother country, the French king entered into an alliance with them in 1778, the colonies powerfully assisted by France, were successful, and Great Britain, in 1782, acknowledged their independence in preliminary articles of peace, finally ratified by the definitive treaty in 1783 The Americans have since formed a new federal constitution Between America (the New World) and the Old World, are several very striking differences, the most remarkable of which is, the general predominance of cold throughout the whole extent of this vast country Here the rigour of the Frigid Zone extends over half that which should be temperate by its position, with regard to the same parallels of latitude in the Old World and even in those latitudes where winter is scarcely felt on the Old Continent, it reigns with great severity in America, though but for a short period Nor does this cold, so prevalent in the New World, confine itself to the Temperate Zones, but extends its influence likewise to the Torrid Zone, considerably mitigating the excess of its heat The natives of this vast country are in some respects different from those of the Old World, for the skins of all the men, except the Eskimaux, are of a red copper colour, and they have no beards, or hair on any part of their bodies, except the head, where it is, black, straight, and coarse In a country of such vast extent there are, no doubt, as great a variety of soils as there are of climates, In short, America may be called an immense treasure of nature, producing most, if not all, of the plants, grains, fruits, trees, woods, metals, minerals, &c to be met with in the other parts of the world and that not only in as great, if not in greater quantities, but many of these in a much higher perfection By the discovery of this country, the Europeans have derived many real and solid advantages Gold and silver have been more plentiful in the countries of Europe since their connection with America, and the Materia Medica hath derived no small assistance from the productions of this continent The various districts which compose this vast country shall be treated of in their respective places and the reader may farther consult the interesting works of Morse, Winterbotham, &c

AMERICUS VESPUCIUS See VESPUCIUS

AMERIMNUM In botany, a genus of the class and order diadelphia decandria, calyx somewhat two-lipped, legume compressed, foliaceous, two-valved, gaping, seeds a few, solitary There are five species, mostly natives of the West Indies, of which one or two are shrubs, and the rest large trees The A. ebenus, is the ebony tree of the West India islands.

AMERIOLA, in ancient geography, a town of Latium, mentioned by Pliny, but not now existing

AMERSHAM, a borough town of Buckinghamshire, with a market on Tuesday It sends two members to parliament Lat 51 40 N Lon 0 35 W

AMES (William), D D a learned independent divine, famous for his controversial writings, was born in 1576, and educated at Christ's college, in Cambridge In the reign of king James I he left the university, and soon after the kingdom, on account of his being unwilling to conform to the rules of the church, and retired to the Hague, where he had not been long before he was invited to accept of the divinity chair in the university of Franeker, in Friesland, which he filled, with admirable abilities, for above twelve years, during which his fame was so great, that many came from remote nations to be educated under him He from thence removed to Rotterdam for a change of air which his health demanded, and here he continued during the remainder of his life His controversial writings, which compose the greatest part of his works, are chiefly against Bellarmine and the Arminians He also wrote, 1 A fresh Suit against the Ceremonies 2 Lectiones in Psalmos Davidis 3 Medulla Theologiae, and several pieces relative to the sciences He died of an asthma, at Rotterdam, in November 1633

AMES ACE (a corruption of *ambs ace*) Two aces on two dice (*Dryden*)

AMESBURY See AMBRESBURY

AMETHODICAL (from *a* and *method*) Out of method, irregular

AMETHYST In oryctology, a species of quartz See QUARTZUM

AMETHYST, in heraldry, signifies the purple colour in the coat of a nobleman, which in gentlemen's escutcheons below that degree, is called purpure, and in those of sovereign princes, Mercury

AMETHYSTEA In botany, a genus of the class and order diandria monogynia Corol five-cleft, the lowest segment more expanding, stamens approximate, calyx somewhat campanulate, seeds four, gibbous The only known species is a native of Siberia, with fine blue flowers in small umbels

AMETHYSTINA, in entomology, a species of chrysomela

AMETHYSTINE, is applied, in antiquity, to a garment dyed of the hue of amethyst

AMHARA, a kingdom of Abyssinia, situate between the two rivers Bashilo and Geshen, and having Begemder to the north, the Nile and the kingdom of Gojam to the west, Walaka to the south, and Angot to the eastward about N lat 11 and E lon 39 Ludolf has written a short essay towards a dictionary and grammar of the Amharic See Ludolf's Hist Æthiop p 78, and Bruce's Travels, vol 1 p 425

AMHERST, one of the Magdalen islands in the gulf of St. Lawrence Lat 46 15 N. Lon 61. 30 W Greenwich

AMHERST, one of the counties of Virginia, in North America It sent 896 men to the national militia

AMHURST (Nicholas), was born at Mardon, in Kent, and educated at Merchant Taylors school from thence he was removed to St John's college, Oxford, where his conduct was so irregular that he was expelled, which induced him to publish, in 1724, a satyrical poem against the university, called Oculus Britanniae He continued the same attack in a series of papers called Terrae Filius which were collected and published in two volumes 12mo 1726 On quitting the university, he settled in London, and became a writer by profession His most celebrated undertaking was "The Craftsman, which was carried on for many years with great success In this paper he was assisted by lord Bolingbroke and Mr Pulteney, who totally neglected him when they got into place He died, it is supposed, of a broken heart, in 1741

A'MIA In ichthyology, a genus of the order abdominal of which the following is its generic character head flattened, bony, rough, naked, appearing as if excoriate teeth in the jaws and palate numerous, sharp, erect cirri two, near the nostrils, gill-membrane twelve rayed, body scaly

The only known species is denominated calva, which is thus specifically described tail with a black spot inhabits Carolina, in fresh waters, body roundish, it is seldom eaten Gill covers obtuse bony, gullet with two bony plates, striate from the centre, lateral line straight, pectoral fins not larger than the ventral, ventral placed behind the equilibrium, dorsal long, sloping, tail rounded

A'MIABLE *a* (*amiable*, Fr) 1 Lovely, pleasing (*Hooker*) 2 Pretending love, showing love (*Shaks*)

A'MIABLENESS *s* (from *amiable*) Loveliness, power of raising love (*Addison*)

A'MIABLY *ad* (from *amiable*) In such a manner as to excite love

AMIANTHINITE, of Kirwan, in mineralogy See STRAHLSTEIN

AMIANTHUS See ASBESTUS

AMIATUS, in entomology, a species of hesperia

A'MICABLE *a* (*amicabilis*, Lat) Friendly, kind (*Pope*)

AMICABLE BENCHES, in Roman antiquity, seats allotted for the judices pedanea, or inferior judges

AMICABLE NUMBERS, such as are mutually equal to the sum of one another's aliquot parts Thus the numbers 284 and 220 are amicable numbers, for the aliquot parts 1, 2, 4, 5, 10, 11 20, 22, 44, 55, 110, of 220, are together equal to the other number 284, and the aliquot parts, 1, 2, 4, 71, 142, of 284, are together equal to 220 Two other amicable numbers are 17296 and 18416 The next pair are 9363584 and 9437056 These three pairs of amicable numbers were discovered by F Schooten, who also gave the following rule for ascertaining other pairs let $a = 2$, and n be some integer number such that $3a^n - 1$ and $6a^n - 1$, and $18a^{2n} - 1$ be all three prime numbers, then will $(18a^{2n} - 1) \times 2a^n$ be one of the amicable numbers, and the sum of its aliquot parts is the other

Mr John Gough has lately investigated some properties of these numbers, especially of the Cartesian form, where $a x$ and $a y z$ are amicable numbers, consisting of a common measure a, multiplied by the primes x y, and z He shews, that if a pair of amicable numbers be divided by their greatest common measure, and the prime divisors of these quotients be severally increased by unity, the products of the two sets thus augmented, will be equal Put q = the sum of the divisors of a, then if a be given q is given, but q must be less than a, and if two sets of primes d, x, and r, y, z, can be found, which will make $(1+d)(1+x) = (1+r)(1+y)(1+z)$ &c and also give the following proportion, a a q $(1+d)(1+x)$ $r y z - (1+d+x)$, then will $a d x$, $a r y z$, be amicable numbers

In the amicable numbers of Des Cartes no two of the primes x, y and z, can be equal, nor can any of them be $= 2$, nor can a be a prime q must be less than a yet greater than $\frac{3}{4} a$, and a must be a power of 2

If the primes x, y, z, be given, making $x+1 = (y+1)(z+1)$, to find if they can constitute amicable numbers divide $z+1$ by $y+1$, and call the quotient p, then if p be not 2, nor a power of 2, the thing is impossible but if p be some power of 2, divide $y+1$, by $p+1$, and put the quotient $= f$, then if f be neither 2 nor a power of 2, the thing is impossible but if $f = 2n$, the common multiplier $a = 2f$ Leybourn's Math Repos No 7 N S

AMICABLENESS *s* (from *amicable*) Friendliness, good-will

A'MICABLY *ad* (from *amicable*) In a friendly way (*Prior*)

A'MICE *s* (*amict*, Fr) The first or undermost part of a priest's habit, over which he wears the alb (*Milton*)

AMICIA See AIMUCIUM

AMICTUS, an upper garment worn over the tunica Among ecclesiastics, it was of a square figure, it covered the head and shoulders, and buckled before the breast

AMICULUM, in antiquity, a woman's upper garment

AMID, the same as Diarbekr

AMIDA, a god worshipped by the Japanese, who has many temples erected to him in the island of Japan, of which the principal is at Jedo

AMI'D AMIDST *prep* (from *a* and *mid*) 1 In the midst middle (*Milton*) 2 Mingled with, surrounded by (*Dryden*) 3 Among conjoined with (*Addison*).

AMIENS (the ancient Samarobriva) A famous city of France, it is now the episcopal town of the department of Somme The cathedral is a very fine and stately building Here are nearly 40000 inhabitants the greater part of whom are employed in the linen and

woollen manufactures Lat 49. 54 N Lon 2 23 E.

AMILCAR. There were many Carthaginians of this name, the most celebrated of whom was Amilcar, surnamed Barcas, father to the celebrated Hannibal He was general in Sicily during the first Punic war, and after a peace had been made with the Romans, he quelled a rebellion of slaves, who had besieged Carthage, and taken many towns of Africa, and rendered themselves so formidable to the Carthaginians that they begged and obtained assistance from Rome After this, he passed into Spain with his son Hannibal, who was but nine years of age, and laid the foundation of the town of Barcelona He was killed in a battle against the Vettones, B C 237 He had formed the plan of an invasion of Italy, by crossing the Alps, which his son afterwards carried into execution His great enmity to the Romans was the cause of the second Punic war He used to say of his three sons, that he kept three lions to devour the Roman power

AMISS *ad* (*a* and *miss*) 1 Faultily, criminally (*Addison*) 2 In an ill sense (*Fairfax*) 3 Improper, unfit (*Tillotson*) 4 Wrong, not according to the perfection of the thing (*Dryden*). 5 Reproachful, irreverent (*Daniel*) 6 Impaired in health

AMISSION *s* (*amissio*, Latin) Loss.

To AMIT, *v a* (*amitto*, Lat.) To lose (*Brown*)

AMITTERE LEGEM TERRÆ, among lawyers, a phrase importing the loss of liberty of swearing in any court: the punishment of a champion overcome or yielding in battle, of jurors found guilty in a writ of attaint, and of a person outlawed.

AMITY. *s.* (*amitié*, Fr) Friendship

AMLET. See OMELET

AMMA, or HAMMA (from ἁμμα, *vinculum*, [illegible]) A technical term denoting the bandage employed to sustain ruptures, or hernia.

AMMAN, or AMMANT, in the German policy, a judge who has the cognizance [illegible]

AMMANT is also used among the French for a public notary, or officer who draws up instruments and deeds

AMMANNIA In botany, a genus of the class and order tetrandria monogynia Corol four-petalled, inserted in the calyx, or else none; calyx one-leaved, plaited, eight-toothed, inferior, capsule four-celled There are seven species, some of Indian and some of West Indian birth

AMMATA, in ancient geography a town of Asia, in Palestine, belonging to the tribe of [illegible]

AMMI. Bishopsweed, a genus of the class and order pentandria digynia. Involucres [illegible] flowers [illegible] all fertile; fruit [illegible]. It contains four species, common to the south of Europe and [illegible] [illegible]. The following [illegible] A. majus the A. visnaga [illegible] employed in medicine as a carminative [illegible] the seeds of which have a grateful smell, somewhat like that of origanum, and were formerly administered as a carminative

AMMIUM. 1. AMMI, which see 2 Cinnabar

AMMON, or HAMMON, in heathen mythology, the name of the Egyptian Jupiter, worshipped under the figure of a ram Hammon, the god of the Egyptians, was the same with the Jupiter of the Greeks

AMMONIA, or VOLATILE ALKALI, is composed of about 80 parts of azote and 20 of hydrogen, rendered gaseous by caloric, in which form only it is in a state of purity, though the name is very commonly applied to a solution of the gas in water, with which it readily combines, forming the liquid ammonia of the shops, or the aqua ammoniæ puræ of the London Pharmacopœia.

This gas was discovered by Dr. Priestley, and may be obtained pure by heating the liquid ammonia in a retort connected with the mercurial pneumatic apparatus; or by mixing together three parts of quick lime, and one of muriat of ammonia (sal ammoniac), both in powder, heating the mixture in a retort, and collecting the gas, in a similar manner, over mercury, the muriat is decomposed, the acid uniting with the lime, and the ammonia is liberated in the form of gas. It is necessary, however, that a considerable portion of the gas first raised, being adulterated with common air, should be suffered to escape Ammonia is also one of the constant products of putrefaction, being always evolved during the spontaneous decomposition of animal and vegetable substances it does not, however, exist in them ready formed, but is generated in the process by the union of its principles, hydrogen and azote

The chief properties of this gas are as follow It is transparent, like common air, in proportion to which its weight is as 3 to 5, its specific gravity being 000732, its taste is acrid and caustic, though it does not corrode animal bodies, its smell is highly pungent It is unfit for respiration, producing death in those animals who breathe it the flame of a candle is extinguished by it, being previously enlarged by another flame of a pale yellow colour which surrounds it It is amazingly expansible by heat, and condensible by cold into a liquid The electric fluid also increases its bulk, and decomposes it With water it has so strong an affinity as to be rapidly absorbed by it, to the amount of more than a third of its weight of gas, thus forming liquid ammonia, or solution of ammonia, or, as it was formerly termed, caustic spirit of ammoniac When saturated, the specific gravity of the solution is 0.9054. The addition of carbonic acid to this fluid composes the hartshorn of commerce, or the volatile alkali as formerly known, before the discoveries of Priestley and Black enabled chemists to obtain it in a state of purity. (See CARBONAT OF AMMONIA.) Liquid ammonia has the same properties as the gas, only it possesses them in a less eminent degree, for

the gaseous aggregation being, according to one of the laws of affinity, much weaker than that of liquids, the gas must have a greater tendency to combination than the liquid. It has been observed that, when ice is presented to ammoniacal gas, it is melted, and yet cold is produced; whereas, in combining with water, heat is evolved. This gas is also eagerly absorbed by alcohol, ether, charcoal, sponge, bits of cloth, and all porous bodies. It may be decomposed, not only by electricity, but by oxigenated muriatic acid gas at common temperatures, and at a high temperature by means of black oxide of manganese; also by being passed through a narrow tube of porcelain or glass made red-hot, or by a similar passage in mixture with oxygen gas, or with common air, when a detonation takes place, water is formed, and azotic gas is emitted.

Ammonia is capable of combining with several of the acids, as the sulphuric, nitric, muriatic, boracic, fluoric, carbonic, &c. forming with them so many neutral or secondary salts, distinguished by the names sulphat of ammonia, nitrat, muriat, borat, fluat, carbonat, &c. of ammonia, for an account of which see their respective terms. It has no sensible action on earths, but unites with sulphur in the state of vapour, forming a sulphuret of ammonia, which decomposes water, and becomes thereby hydrogenated, or hydrogureted sulphuret of ammonia, formerly called the fuming liquor of Boyle. When ammonia is made to pass through ignited charcoal, it forms it with prussic acid.

Though ammonia is incapable immediately of combining with the metals, yet by the decomposition of the water with which it is united, some of them are converted into oxides, and are thus rendered soluble. The oxides of cobalt, copper, silver, nickel, gold, tin, bismuth, and mercury, may be dissolved by digestion, in liquid ammonia: the four first have lately been examined with a view to the purification of nickel by ammonia, by Mr. R. Phillips, whose paper on the subject may be seen in the Philos. Mag. Vol. XVI. p. 312, and who has ascertained that the affinity of ammonia for these four oxides is in the order in which they are here placed. With the oxide of gold, ammonia forms a compound, formerly termed aurum fulminans, or fulminating gold, which explodes with amazing violence on being heated or rubbed; with oxide of silver, another compound is formed, of a similar nature, called argentum fulminans, or fulminating silver; and with the red oxide of mercury, another substance is produced which also detonates violently under the same circumstances. A more detailed account of their properties, with the methods of preparing them, will be given under the article FULMINATING SUBSTANCES. See also the terms GOLD, SILVER, and MERCURY.

AMMO'NIA MURIATA. The article to which this name is given in the pharmacopœias, being a muriat of ammoniac, is called in the new chemical nomenclature, murias ammoniacæ. It is found in great abundance in nature, and may be prepared from a variety of substances. (See SAL-AMMONIAC.) It derives its name of ammonia from the country of this denomination (a part of Africa), from which it was formerly supposed to have been first imported.

AMMONIA PREPARATA. (*ammonia.*) Prepared ammonia. Sal volatile salis ammoniacæ. Sal alkali volatile. The article under this name in the pharmacopœias is called carbonis ammoniacæ crystallisatus in the new chemical nomenclature, it being a pure crystalized carbonat of ammonia. The preparation termed sal volatilis cornu cervi, although obtained by a different process, is in fact the same thing. It possesses stimulating, nervine, antacid virtues, and is in these points of view in high estimation in debility, typhus, ataxia, atonic spasms, paralysis, syncope, arthritis, rheumatism, &c.

AMMO'NIAC. (*ammoniaca.*) Ammoniacal gas. The substance to which this name is given in new chemical nomenclatures, is what was formerly called volatile alkali. It is a fluid resembling air, and has the same transparency and elasticity; it is rather lighter, however, its smell is more penetrating, and its taste is acrid and caustic: hence it produces inflammations of the eyes, catarrhs, &c. diseases to which those people who are exposed to its action, from being near putrid animal substances, urine, &c. and in laboratories, are very subject. This air, or ammoniacal gas, chemists have ascertained to be a compound substance, consisting of hydrogen and azot. Although ammoniac has not yet been employed medicinally in its aeriform state, its compounds are not neglected. Ammoniac is readily absorbed by water, and when this fluid is saturated with it, it is termed fluor, or caustic volatile alkali, alkali volatile causticum, alkali animale purum, and in the pharmacopœias, aqua ammoniæ puræ. The sulphat of ammoniac, a salt formed by the combination of ammoniac with the sulphuric acid, is esteemed for its diuretic and deobstruent qualities, and is described by Bergman under the title of alkali volatile vitriolatum, and by Glauber by the name sal ammoniacum secretum. Ammoniac and nitric acid form a salt, the nitrat of ammoniac, nitrus ammoniacæ, which possesses deobstruent virtues, and is described by Bergman under the name of alkali volatile nitratum. The direct combination of muriatic acid with ammoniac forms the muriat of ammoniac. See AMMONIA MURIATA and SAL-AMMONIAC.

AMMONIA'CUM. Gum ammoniac. (αμμωνιακον, from the country that was first observed to produce it.) A concrete gum-resin, composed of little lumps or tears, of a strong and rather unpleasant smell, and nauseous taste accompanied with bitterness. It is at present imported into this country from Turkey and the East Indies. Internally it is employed by physicians in asthmas and difficulty of expectoration. Externally it is used in the form of a

plaster with acetum scillæ, as a powerful discutient in pneumonia, and other local inflammations.

AMMONI'ACUM GUMMI. See GUM AMMONIACUM.

AMMONITÆ, in natural history, the same with the cornua ammonis, or snake-stones.

AMMONITES, in ancient history, the descendants of Ammon.

AMMONITIS (anc. geog.), a country of Arabia Petræa, occupied by the children of Ammon, whence the appellation. Its limits, partly to the west, and partly to the north, were the river Jabbok, whose course is no where determined, though Josephus says that it runs between Rabbath-Ammon, or Philadelphia, and Gerasa, and falls into the Jordan.

AMMONIURES (Metallic). Substances composed of the different metals united to ammonia. There are not many of these at present known, and those few which are known have been but imperfectly investigated. Brugnatelli (Ann. de Ch. no. 98.) has examined the ammoniures of cobalt, mercury, zinc, copper, and arsenic.

Ammoniure of cobalt is formed by dissolving the grey oxide of this metal, called zaffar, or the yellow oxide, in ammonia. The latter is the most pure, and possesses the following properties: it has a yellow, and sometimes a rose colour; is not decomposed by acids, though it is deprived of its colour by the muriatic acid; it is changed to grey by prussiate of potash, and to a dark colour inclining to black, by sulphure of potash; it decomposes borate of soda, precipitating very white borate of cobalt. P. M. vol. xi. p. 229.

From this substance Brugnatelli obtained a peculiar acid, to which he gave the name of COBALTIC ACID, an account of which may be found under its proper term.

AMMOPHILA. Sand-wasp. This insect was till lately regarded as a species of the Linnéan genus sphex, and order hymenoptera. Upon the authority of Mr. Kirby, and a higher in this order of entomology we could not quote, we have ventured to place it in a genus by itself, and have been preceded in the arrangement by Dr. Turton. It is probable that various others of the spheges or sphexes, might with propriety be removed into the same genus. Thus divided, its character is as follows: and the reader should carefully compare it with the generic character of the sphex, as drawn by Linnéus, for which see SPHEX: snout conic, inflected, concealing a bifid, retractile, tubular tongue: jaws forcipated, three toothed at the tip; antennas, filiform in each sex, with about fourteen articulations; eyes oval; wings plane; sting pungent, concealed in the abdomen.

The four species of the sphex referred to this new genus, are the a. vulgaris, a. affinis, a. hirsuta, a. argentea. They are all inhabitants of Europe. The first is the sphex sabulosa of Linnéus and Fabricius, an frequenter of sandy sunny banks, where it digs a hole with its fore-feet, and buries the carcase of the larva of a moth, or a half-dead spider, in the body of which it deposits its eggs, and then covers up the orifice.

AMMODYTES. Launce. In ichthyology, a genus of the Linnéan order apodal, or without ventral fins. Its generic character is head compressed, narrower than the body; upper lip doubled in; lower jaw narrow, pointed; teeth very sharp; gill membrane seven rayed; body long, square; the sides rounded: caudal fin distinct.

Of this genus, which takes its name from its fondness for diving into and burying itself in the sand, there is but one known species, the a. tobianus, or sand launce, which inhabits the sandy shores of the northern seas; is from nine to twelve inches long; buries itself on the recess of the tides a foot deep in the sand, and in fine weather rolls itself up and lifts its nose just above the sand; and is the prey of other rapacious fishes. The flesh is good, but it is commonly used for baits. See Nat. Hist. pl. IV.

The head of the a. tobianus is oblong, eyes small, pupil black, iris silvery; in the jaw are two rough oblong bones, region of the gills silvery: back blue, beautifully varied with green, with silvery sides and belly; lateral line straight, vent nearer the tail, with a brown spot close by it; rays of the fins soft; tail forked.

AMMOSCHISTA, a genus of stones of a laminated structure, and splitting only horizontally, or into flat plates.

AMMUNITION, a general name for all warlike provisions, but more particularly powder, ball, &c. Ammunition arms, utensils of war, gunpowder, imported without licence from his majesty, are, by the laws of England, forfeited, and triple the value. And, again, such licence obtained except for furnishing his majesty's public stores, is to be void, and the offender to incur a premunire, and to be disabled to hold any office from the crown.

AMNESIA (from α priv. and μνησις, memory.) Forgetfulness. See AMNESTIA.

AMNESTIA (from α priv. and μνηστις, memory.) Forgetfulness; a morbid want of memory.

AMNESTY, or AMNISTY, a kind of general pardon, which a prince grants to his subjects, by a treaty or edict, wherein he declares, that he forgets and annuls all that is past, and promises not to make any farther inquiry into the same. The word is αμνηστια, amnestia, which was the name of an ancient law of this kind, passed by Thrasybulus upon the expulsion of the thirty tyrants out of Athens. Andocides, an Athenian orator, whose life is written by Plutarch, and of whom we have an edition of the year 1575, gives us, in his Oration upon Mysteries, a formula of the amnesty, and the oaths taken thereupon.

AMNION, A'MNIOS (αμνιον, from αμνος, a lamb, or lamb's skin, so called on account of its delicacy.) The soft internal membrane that surrounds the fetus.

AMNIOS, LIQUOR OF THE, is a fluid in which all the young of the mammalia are

enclosed previously to their birth It has recently been examined by the French chemists, who, by abolishing the old method of analysis by fire only, and introducing many improvements in its stead, have done much towards increasing our acquaintance with vegetable and animal substances, though these are yet much less perfectly known than the different kinds of inorganised matter Two species of the amniotic liquor have been examined by Vauquelin and Buniva that afforded by the human female, and that procured from the cow These are very different from each other, and possess respectively the following properties

The first is slightly saline to the taste, of a dilute white colour, though by filtration it becomes transparent It froths by agitation, becomes semiopake when heated, changes the colour of tincture of violets to green, and slightly reddens that of tornsol The acids clarify it, alcohol throws down a light precipitate, infusion of gall-nut, a brown one very copiously, and nitrate of silver a white one, insoluble in nitric acid It appears, therefore, to be composed of an albuminous matter, similar to that of the blood, a muriatic salt, probably muriate of soda, and a small quantity of free or carbonated alkali Its specific gravity is 1 005

The liquor obtained from the amnios of the cow is of a brownish red colour, an acid bitterish taste, a viscous con istence, and an odour much like that of vegetable extract It reddens the tincture of tornsol, gives an abundant precipitate with muriat of barytes, and deposits a large quantity of reddish matter by the action of alcohol Its specific gravity is 1 028 On evaporation, a thick scum rises to the surface, and after being reduced to a quarter of its bulk, a number of long, acid, needle form crystals are produced as the liquor cools, on continuing the process till the matter is brought to the consistence of honey a fresh deposition of crystals takes place, which differ in form from the preceding, and are sulphat of soda The extractive matter, on separation, has the appearance of a compact adhesive cement, of a reddish brown colour, and a peculiar indescribable flavour, and the crystals first obtained, exhibiting properties different from those of all the known acids, has received the denomination of the

AMNIOTIC ACID This acid was first discovered, as stated above in the amniotic liquor of the cow it combines readily with the caustic alkalies, forming a very soluble salt, but will not decompose the carbonated alkalies without the assistance of heat It is separated from its all line combinations by the mineral acids, in form of a white crystalline powder It produces no change in the aqueous solution of the alkaline earths It is destroyed by heat, leaving behind a spongy coal *Annales de Chimie*, vol xxxiii p 269

AMOL, a town belonging to the Usbecks, in Asia, seated on the river Gihon Lat 39 20 E Long 64 30 E

AMOMUM (from *hamom*, Arab a pigeon, whose foot it was thought to resemble) Ginger A genus of the class and order monandria monogynia Calyx five-cleft, unequal, cylindrical, corol three parted, unequal, expanding, nectary two lipped, nearly erect There are ten species produced in the East and West Indies, and one, the a granum paradisi, on the coasts of Guinea It is the dried root of the a zingiber that constitutes the ginger of our shops, for which see ZINGIBER

AMOMUM GERMAN See SISON

AMOMUM PLINII See SOLANUM

AMOMUM CARDAMOMUM See CARDAMOMUM MINUS

AMOMUM GRANUM PARADISI See GRANA PARADISI

AMONG, AMONGST *prep* (amang, Saxon) 1 Mingled with (*Milton*) 2 Conjoined with others, so as to make part of the number (*Addison*)

AMONTONS (William) a French philosopher, was born in Normandy in 1663 Being seized with an incurable deafness, he applied himself to the study of mechanics and practical mathematics In 1687, he presented a new hygroscope to the Academy of Sciences, which was approved He also was one who found out a method to convey information from one place to another by signals, which is that now known by the name of the telegraph In 1695, he published a book on the construction of barometers, thermometers, &c In 1699, he was admitted a member of the Royal Academy, and read there a new theory of friction He died in 1705, aged forty-two years Many of his papers are printed in the different volumes of the Memoirs of the Academy of Science viz the volumes for 1696, 1699, 1702, 1703 1704 and 1705

AMORGUS, an island of the Archipelago, fertile in corn, wine, and oil Lat 36 20 N, Long 26 15 E

AMORIS POMUM In botany See SOLANUM

AMORIST s (from *amour*) An inamorato, a gallant, a man professing love (*Boyle*)

AMORITES, a people descended from Amorrhæus, according to the Septuagint and Vulgate, Emoræus, according to other expositors, Hamori, according to the Hebrew, or Emorite, according to our version of the Bible, who was the fourth son of Canaan Gen x 16 The name Amorite is often taken in Scripture for all Canaanites in general

AMOROSO in the Italian music, implies tenderly, with affection and supplication

AMOROUS *a* (*amoroso*, Ital) 1 In love, enamoured (*Shakspeare*) 2 Naturally inclined to love, fond (*Prior*) 3 Belonging to love (*Waller*)

A'MOROUSLY *ad* (from *amorous*) Fondly, lovingly (*Donne*)

A'MOROUSNESS, *s* (from *amorous*) Fondness, lovingness, love (*Boyle*)

AMORPHA Bastard indigo A genus of the class and order diadelphia decandria

Calyx campanulate, five cleft banner ovate, concave, wingless and keelless, legume falcate, two seeded There are two species, both natives of Carolina a fruticosa a shrub with pinnate leaves, and purple flowers and a pubescens, a herb pubescent, with bluish-white flowers

AMORT ad (a la mort Fr) In the state of the dead, spiritless (*Shakspeare*)

AMORTIZATION, AMORTIZEMENT s (*amortissement*, Fr) The right or act of transferring lands to mortmain (*Ayliffe*)

To AMORTIZE v a (*amortir*, French) To alien lands or tenements to any corporation or fraternity (*Blount*)

AMORY (Thomas), a dissenting divine, was born at Taunton, in Somersetshire, in 1700 He received his education under Mr Chadwick, and afterwards under his uncle, Mr Henry Grove, whom he succeeded as principal tutor in the academy at Taunton He officiated as a dissenting minister in his native town from 1730 to 1759, when he removed to London, and became afternoon preacher in the congregation in the Old Jewry In 1768, the university of Edinburgh conferred on him the degree of D D At this time he became one of the lecturers at Salters-hall, previous to which he had succeeded Dr Chandler in the pastorship at the Old Jewry In 1770, he became morning preacher at Newington-green He was one of the committee appointed by the dissenters, in 1772, to procure an extension of the act of toleration He died in 1774, and was interred in Bunhill fields burying-ground Dr Amory's character was very amiable, and his sermons, in two volumes octavo, shew him to have been an able divine He wrote the Life of Mr Henry Grove Memoirs of Dr Benson, and of Dr Samuel Chandler (*Watkins*)

AMOS, the third of the twelve lesser prophets, was a herdsman of the city of Tekoa He prophesied under Uzziah and Jeroboam II and foretold the captivity and the establishment of the ten tribes He was put to death by Amasius, priest of Bethel, about 785 years before Christ He ought not to be confounded with Amos, the father of Isaiah

To AMOVE v a (*amoveo*, Latin) 1 To remove from a post or station 2 To remove, to move, to alter (*Spenser*)

To AMOUNT v n (*monter* French) To rise to in the accumulative quantity, to compose in the whole (*Burnet*)

AMOUNT s The sum total (*Thomson*)

AMOUR s (*amour* Fr) An affair of gallantry, an intrigue (*South*)

AMOY or EMOY, an island belonging to the province of Fokien, on the S W coast of China here the English once had a factory Lat 24 30 N Long 118 45 E

AMPELIS Chatterer In ornithology, a numerous genus of the order passeres, thus characterised bill straight, convex, subincurvated, each mandible notched nostrils covered with bristles, tongue sharp, cartilaginous, bifid, middle toe connected at the base to the outmost

Of this genus there are fourteen known species 1 a garrulus, waxen chatterer (see Nat Hist pl VI), 2 a pompodosa, pompadour chatterer, 3 a carnifex, red chatterer, 4 a coccinea, scarlet chatterer, 5 a cotinga, purple breasted, 6 a maynana, silky, 7 a cayana, purple throated, 8 a tersa, blue-breasted, 9 a carunculata, carunculated, 10 a variegata, variegated, 11 a cinerea, grey, 12 a, phœnicea, red-winged, 13 a lutea, yellow, 14 a cristata, crested

They are all natives of Africa or America, except the a garrulus, or waxen chatterer, which is sometimes met with in our own country, and in length and size resembles a starling Pennant asserts that this bird appears annually about Edinburgh, and feeds on the berries of the mountain ash It is also said to breed in parts more northerly, and to form its nest in the holes of the rocks

AMPHEMERINAS, AMPHEMERINUS (from αμφι, *about*, and ημερα, *a day*) A quotidian ague or intermittent

AMPHIARAUS, son of Oicleus, or according to others, of Apollo, accompanied the Argonauts in their expedition He was famous for his knowledge of futurity He married Eriphyle, the sister of Adrastus king of Argos, by whom he had two sons, Alcmæon and Amphilochus When Adrastus, at the request of Polynices, declared war against Thebes, Amphiaraus secreted himself, not to accompany his brother in-law in an expedition in which he knew he was to perish But Eriphyle who knew where he had concealed himself was prevailed upon to betray him by Polynices, who gave her, as a reward for her perfidy, a famous golden necklace set with diamonds Amphiaraus being thus discovered, went to the war, but previously charged his son Alcmæon to put to death his mother Eriphyle, as soon as he was informed that he was killed Amphiaraus was swallowed up in his chariot by the earth as he attempted to retire from the battle The news of his death was brought to Alcmæon who immediately executed his father's command, and murdered Eriphyle Amphiaraus received divine honours after death, and he had a celebrated temple and oracle at Oropos in Attica

AMPHIARTHROSIS (from αμφι, *either*, and αρθρωσις, *an articulation*) A mixt kind of articulation, which admits of an obscure motion, as in the vertebræ of metatarsal bones

AMPHIBIA (αμφιβια, *utrinque vitam habentes*, from αμφι, *contra* and βιος *vita*) Amphibious animals or capable of existing in two distinct elements as air and water In zoology, the third class in the Linnéan system The following is its classical character heart, one auricle one ventricle, blood cold and red jaws incumbent, penis (frequently) double, eggs (usually) membranaceous, organs of sense tongue, nostrils, eyes, ears, covering a naked skin, supporters various, in some none creep in warm places and hiss

This class of animals is farther distinguished by a body cold and generally naked, a countenance stern and expressive, voice harsh, colour mostly lurid, and filthy odour A few are furnished with a deadly poison, all have cartilaginous bones, slow circulation, exquisite sight and hearing, large, pulmonary vessels, lobate liver, oblong, thick stomach, and cystic, hepatic and pancreatic ducts they are deficient in diaphragm, do not transpire, can live a long time without food, are tenacious of life, and have the power of re-producing parts which have been lost or destroyed, in a most wonderful manner, some undergo a metamorphosis, some cast their skin, some appear to live promiscuously on land or in the water, and some are torpid during the winter

They were formerly divided into four orders, a nantes, and a meantes, constituting the third and fourth these have since been removed into the first two orders, which now embrace the entire class, and are denominated 1 reptilia, reptiles, 2 serpentes, serpents of which the first have feet, and flat naked ears without auricles, the last have no feet, eggs connected in a chain, penis double, and muricate

These last are cast upon the earth naked, without limbs, exposed to every injury, but frequently armed with a mortal venom, contained in tubular fangs resembling teeth, placed without the upper jaw, protruded, or retracted at pleasure, and surrounded with a glandular vesicle, by which this fatal fluid is secreted But lest this tribe should too much encroach upon the limits of other animal life, the benevolent Author of nature has armed about a fifth part only of it in this deadly manner, while in order to inspire other animals with a suspicion sufficiently extensive, he has ordained that all of them should cast their skins as a mark of the class to which they belong The jaws are dilatable and not articulate, and the œsophagus so lax that they can swallow, without mastication, an animal twice or thrice as large as the neck of the deglutient serpent the colour is variable, and changes according to season, age, or mode of living, and frequently converts to another in the dead body tongue filiform, bifid, skin reticulate The species under these respective orders are as follow

I *Reptilia, Reptiles, or possessing feet*

1 Testudo, tortoise body four-footed, covered with a shell, 2 draco, flying dragon body four-footed, tailed and winged, 3 lacerta, lizard or crocodile body (mostly) four-footed, tailed, naked, 4 rana, frog, toad body five-footed, naked, tailless, 5 siren, siren body two footed, tailed, naked

II *Serpentes, serpents, or footless*

1 Crotalus, rattle snake plates on the belly and tail, with a rattle 2 Boa, boa plates on the belly and tail, without a rattle 3 Coluber viper plates on the belly scales on the tail 4 Anguis, snake scales on the belly and tail 5 Amphisbæna rings on the belly and tail 6 Cæcilia body with naked lateral wrinkles 7 Acrochordus body covered with warty tubercles

For a more particular description of these genera, see the genera themselves, TESTUDO, DRACO, LACERTA, &c

AMPHIBIOLOGY (from αμφιβια, amphibia, and λογο, *a discourse* or *treatise*) The doctrine or science of amphibious animals, as ornithology is the doctrine or science of birds, and ichthyology that of fishes

AMPHIBIOLITHUS In oryctology, a genus of the class petrefactions consisting of the body or some other part of an amphibious animal changed into a fossile substance The most common species yet discovered are 1 a testudinis, petrified tortoise, found entire, or in parts, sometimes in the stone quarries of Oxfordshire, in a bed of schist in Switzerland, or St Peter's Mountain, near Maestricht in Brabant, near Berlingham in Switzerland, in Malta, in Leipsic, or other parts of Saxony, 2 a ranæ petrified toad, the head found in a bed of schist in Switzerland, and an entire figure in a schistous swine stone at Oeningen, 3 a crocodile, petrified crocodile, found near Elston in Gloucestershire, in indurated clay, near Drax in Aquitain, at the depth of fifty yard beneath the surface of the earth and in various other places

AMPHIBIOUS (AMPHIBIA, which see) A term applied to animals which live both on land, and in the water, that is, which breathe the air, but pass part of their time in the water, as affording them their chief food Such are the frog, castor, otter, tortoise, sea calf, crocodile, &c Most of the amphibious kind, the castor and otter excepted, have peculiar provisions in their structure, to fit them for so various a way of living, particularly in the heart, lungs, foramen ovale, &c

The term amphibious is sometimes also extended to men, who have the faculty of living a long time under water

We have divers instances of such amphibious men, the most remarkable is of a Sicilian, named the Fish-Colas Kircher relates, that by a long habitude from his youth, he had so accustomed himself to live in water, that his nature seemed to be quite altered, so that he lived rather after the manner of a fish than a man A Calabrian monk at Madrid laid claim to this kind of amphibious capacity, making an offer to the king of Spain to continue twice twenty four hours under water, without ever coming up to take breath

AMPHIBIOUSNESS *s* (from *amphibious*) The quality of being able to live in different elements

AMPHIBLESTROIDES (from αμφιβληστρον, *a net*, and ειδος, *similar*) The retina, or net-like coat of the eye Reticulate

AMPHIBOLOGICAL *a* (from *amphibology*) Doubtful

AMPHIBOLOGICALLY *ad* (from *amphibological*) Doubtfully

AMPHIBOLOGY, or AMPHIBOLIA, in grammar, a fault in language, whereby it is rendered obscure, and liable to be understood

2

in a double sense. The word comes from ἀμφίβολος, *ambiguous*, and λογος, *discourse*. Amphibology is chiefly used in respect of a phrase, as equivocal is in respect of a word.

AMPHIBOLOUS. *a.* (ἀμφι and βαλλω.) Tossed from one to another; striking each way. (*Howel.*)

AMPHIBRACHYS, in ancient poetry, the name of a foot consisting of three syllables, whereof that in the middle is long, and the other two short; such is the word abire.

AMPHICTYONS, in Grecian antiquity, an assembly composed of deputies from the different states of Greece, and resembling, in some measure, the diet of the German empire. They decided all public differences and disputes between any of the cities of Greece; but before they entered on business, they jointly sacrificed an ox cut into small pieces, as a symbol of their union. Their determinations were received with the greatest veneration, and even held sacred and inviolable. The stated terms of their meeting were in spring and autumn; the spring was called Εαρινη Πυλαια, that in autumn Μετοπωρινη. On extraordinary occasions, however, they met at any time of the year, or even continued sitting all the year round. Philip of Macedon usurped the right of presiding in the assembly of the Amphictyons, and of first consulting the oracle which was called Προμαντεια.

AMPHICTYONIC FAIRS, occurred twice in the lapse of twelve months. These fairs arose in consequence of the assemblies of the states general. Multitudes of people were drawn together at Delphi in the spring, or at Thermopylæ, where the second sittings were held in autumn. It was impossible, says Depauw, for the Greeks to meet in any place, under whatever pretext, without some commercial transactions. Dion Chrysostom accuses the Amphictyonic fairs of being an infamous traffic of slaves, destined for public incontinence; and the charge has not been entirely refuted. Still, however, the autumnal fair at Thermopylæ displayed, likewise, abundance of medicinal herbs and roots, collected on the brow of Oeta, the chief of these was hellebore, which the Greeks employed almost universally against disorders of both body and mind.

AMPHIDROMIA, a festival observed by private families at Athens, the fifth day after the birth of every child. It was customary to run round the fire with a child in their arms, whence the name of the festival.

AMPHILOCHIUS, son of Amphiaraus and Eriphyle, was a celebrated diviner. He had an altar erected to him at Athens, and an oracle at Mallus in Cilicia, which city was founded by him and Mopsus. The answers of this oracle were given by dreams: the party enquiring used to pass a night in the temple, and that night's dream was the answer. Dion Cassius mentions a picture done by order of Sextus Condianus, representing the answer he received of the oracle, in the reign of the emperor Commodus.

AMPHIMACER, in ancient poetry, a foot consisting of three syllables, whereof the first and last are long, and that in the middle short; such is the word castitas.

AMPHION, in fabulous history, the son of Jupiter and Antiope: he played so well on the lyre, that the rocks were said to follow him, and the stones moved by his harmony, ranged themselves in order, and formed the walls of Thebes. He married Niobe, whose insult to Diana occasioned the loss of their children; when the unhappy father, filled with despair, attempted to destroy the temple of Apollo, but was punished by the loss of his sight and skill, and cast into the infernal regions.

The fable of Amphion's moving stones and raising the walls of Thebes by his harmony, has been explained by supposing that he persuaded, by his eloquence, a wild and uncivilized people to unite together and build a town to protect themselves against the attacks of their enemies.

AMPHION, in entomology, a species of HESPERIA, which see.

AMPHIPOLES, in antiquity, the principal magistrates of Syracuse. They were established by Timoleon in the 109th Olympiad, after the expulsion of the tyrant Dionysius. They governed Syracuse for the space of 300 years: and Diodorus Siculus assures us, that they subsisted in his time.

AMPHIPOLIS, now called Christopolis, a city of Macedonia, in European Turkey. It was built by Cymon, the famous Athenian, about 470 years before Christ, and peopled with a colony of his countrymen. Lat. 41. 38 E. Long. 24. 16 E.

AMPHIPPI, in antiquity, those who practised riding on two horses, by jumping from one to the other.

AMPHIPROSTYLE, a temple which had four columns in front, and as many in the aspect behind.

AMPHISBÆNA. In zoology, a genus of the Linnean class amphibia, order serpentes. The following is its generic character: rings on the body and tail; no scales; the body smooth, equal, cylindric: the tail scarcely distinguishable from the head, and very obtuse. From this muscular similarity of the head and tail, and their equal power of seizing and compressing its prey, this genus derives its name, viz. ἀμφι, *circiter, utrinque*, and σβεννυω *comprimor*.

The amphisbæna comprises fives species, all of them natives of America. 1. a. fuliginosa, 2. a. varia, 3. a. magnifica, 4. a. flava, 5. a. alba. This last has two varieties; it frequents ant-hills, from its fondness of these animals, for its food. With its little obtuse snout it digs a hole in these situations, and buries itself from sight. See Nat. Hist. pl. II. III.

AMPHISCII, among geographers, a name applied to the people who inhabit the torrid zone. The amphiscii, as the word imports, have their shadows one part of the year towards the north, and the other towards the south. They are also called Ascii.

AMPHITAPÆ, in antiquity, a kind of carpets, or clothing, having a soft warm knap on each side

AMPHITHEATRE, in antiquity, a spacious edifice, with a number of rising seats, from whence the people used to behold the combats of gladiators, of wild beasts, and other sports Amphitheatres were at first only of wood, and it was not till the reign of Augustus, that Statilius Taurus built one of stone The lowest part was of an oval figure, and called arena, because, for the conveniency of the combatants, it was usually strewed with sand, and round the arena were vaults styled caveæ, in which were confined the wild beasts appointed for the shows Above the caveæ was erected a large circular peristyle, or podium, adorned with columns This was the place of the emperors, senators, and other persons of distinction The rows of benches were above the podium Their figure was circular, and they were entered by avenues, at the end of which were gates called vomitoriæ The theatre was built in form of a semicircle, only exceeding a just semicircle by one-fourth part of the diameter, and the amphitheatre was nothing else than a double theatre, or two theatres joined together so that the longest diameter of the amphitheatre was to the shortest as one and a half to one

There are amphitheatres still standing at Rome, Pola, &c That of Vespasian, and that at Verona, are the most celebrated now remaining It is computed that the amphitheatre of Vespasian would hold 87,000 spectators

AMPHITRION, in entomology, a species of PAPILIO, which see

AMPHITRITE In zoology, a genus of the class and order vermes mollusca thus characterised, body projecting from a tube and annulate, peduncles or feet small, numerous, feelers two, approximate, feathered, eyeless Seven species, some of cold, others of hot climates A reniformis, and A auricoma, are beautiful worms The former inhabits the seas about Iceland, with a bright scarlet body, about three inches long, the latter the Atlantic, Indian, and South Seas, with a steel-blue trunk, very smooth, and fourteen tufts of gold bristles, each side at the margin, three or four in each

AMPHODONTA (compounded of ἀμφι and ὀδὸς, teeth) In zoology, a designation given to animals which have teeth in both jaws

AMPHORA, in antiquity, a liquid measure among the Greeks and Romans The Roman amphora contained about seven gallons and an eighth of our wine measure the Grecian or Attic amphora about nine gallons and a half Amphora was also a dry measure used by the Romans, holding about three bushels Among the Venetians, amphora is the largest liquid measure, and holds about four gallons

AMPHORA, in astronomy, the constellation Aquarius

AMPHORARIUM VINUM, in antiquity, denotes that which is drawn or poured into amphoræ, or pitchers, by way of distinction from vinum doliare, or cask wine

AMPHOTIDES, armour for the ears, used by the ancient pugiles

AMPLA, in conchology, a species of voluta Shell elongated, aperture large, lip acute, wreaths of the spire scarcely visible

AMPLE a (amplus Latin) 1 Large, wide extended (*Thomson*) 2 Great in bulk (*Shakspeare*) 3 Unlimited, without restriction (*Dryden*) 4 Liberal, large, without parsimony (*Hooker*) 5 Magnificent splendid (*Clarendon*) 6 Diffusive, not contracted

AMPLENESS s (from *ample*) Largeness splendour (*South*)

AMPLEXICAULE FOLIUM, a stem-clasping leaf, embracing, clasping or surrounding the stem by its base Some leaves go only half round, these are called semiamplexicaulia

To AMPLIATE v a To enlarge, to make greater to extend (*Brown*)

AMPLIATION s (from *ampliate*) 1 Enlargement, exaggeration (*Ayliffe*) 2 Diffuseness, enlargement (*Holder*)

AMPLIATION, in Roman antiquity, the deferring to pass sentence in dubious causes, which the judge did by pronouncing the word amplius

To AMPLIFICATE v a (*amplifico*, Lat) To enlarge, to amplify

AMPLIFICATION s (*amplification*, Fr) 1 Enlargement extension 2 Exaggerated representation (*Pope*)

AMPLIFICATION, in rhetoric, part of a discourse or speech, wherein a crime is aggravated, a praise or commendation heightened, or a narration enlarged, by an enumeration of circumstances, so as to excite the proper emotions in the souls of the auditors Such is the passage in Virgil, where instead of saying merely that Turnus died, he amplifies the circumstances of his death

—Ast illi solvuntur frigore membra,
Vitaque cum gemitu fugit indignata sub umbras

The masters of eloquence make amplification to be the soul of discourse Longinus speaks of it as one of the principal means which contribute to the sublime, but he censures those who define it a discourse which magnifies things, this equally agreeing to the sublime, the pathetic, &c

AMPLIFIER s (from *to amplify*) One that exaggerates (*Sidney*)

To AMPLIFY v a (*amplifier*, Fr) 1 To enlarge (*Bacon*) 2 To exaggerate any thing (*Davies*) 3 To improve by new additions (*Watts*)

To AMPLIFY v n 1 To lay one's self out in diffusion (*Watts*) 2 To form pompous representations (*Pope*)

AMPLITUDE s (*amplitude*, Fr) 1 Extent (*Glanville*) 2 Largeness, greatness (*Bacon*) 3 Capacity (*Milton*) 4 Splendour, grandeur (*Bacon*) 5 Copiousness, abundance (*Watts*)

AMPLITUDE, in astronomy, an arch of the horizon intercepted between the east or west point and the centre of the sun, or a planet, at its rising or setting, and so is either north and south, or ortive and occasive The amplitude of a heavenly body may be found trigonometrically by saying, as the cosine of the latitude, to radius, so is, the sine of the declination of the body, to the sine of its amplitude O Gregory's Astron p 81

Magnetical Amplitude, is an arch of the horizon contained between the centre of the celestial body when rising or setting, and the east or west point of the compass It is always equal to the difference between the true amplitude and the variation of the compass

AMPLY *ad* (*amplè*, Fr) 1 Largely, liberally (*Atterbury*) 2 At large, without reserve (*Milton*) 3 Copiously, with a diffusive detail (*Dryden*)

AMPTHILL, a town of Bedfordshire, with a market on Thursdays Lat 52 0 N Long 0 30 W

AMPULLA (αμβολλα, from αναβαλλω, *to swell out*) A vessel, either animal or chemical, that bellies out like a bottle or jug

AMPULLA, in antiquity, a round big bellied vessel, used for various purposes, as to contain oil for consecration, anointing, bathing, &c

AMPULLULÆ (dimin of *ampulla*) In anatomy, the bases or bulbous extremities of the lacteals The villi of the intestines resemble in appearance piles of velvet each villus has about fifteen absorbent orifices, and about a hundred of them converge to form the bulbous end, or ampullula of every lacteal trunk

AMPURIAS, a sea port town of Catalonia, in Spain, 60 miles N E of Barcelona Lat 42 5 N Long 3 6 E

To AMPUTATE *v a* (*amputo*, Lat) To cut off a limb (*Wiseman*)

AMPUTATION (*amputatio*, from *amputo*, to cut off) A surgical operation, which consists in the removal of a limb or viscus thus we say a leg a finger, when cut off, is amputated, but when speaking of a tumor, or excrescence, it is said to be dissected or removed

AMRAS, a strong castle of Germany, on the river Tirol, full of rarities of every kind It has a library with the portraits of many learned men Lat 47 0 N Long 11 20 E

AMSEGETES, in antiquity, those whose grounds abutted on the highway

AMSTERDAM, the capital of Holland, and of all the United Dutch States, is situated on the river Amstel at its conflux with the river Ye or Wye, which forms a port capable of receiving a thousand large vessels, about two leagues from the Zuyder sea It takes its name from Amstel and Dam, being as it were the dam or dike of the Amstel In the beginning of the thirteenth century, it was the residence only of a few fishermen, but soon after growing populous the earls of Holland gave it the title and privileges of a city, and in the year 1490 it was surrounded by a wall of brick, by order of Mary of Burgundy, to defend it from the incursions of the inhabitants of Utrecht, who had quarrelled with the Hollanders It has been frequently enlarged, particularly in the years 1593, 1595, 1601, 1612, 1650, and 1675, at which last date it was extended to its present size, and surrounded by a wall and a large ditch, eighty feet wide, full of running water, the walls were fortified with twenty-six bastions there are eight gates towards the land, and one towards the water The city at present is supposed to contain 250000 inhabitants forty-four leagues from Brussels, forty-nine from Liege, and 112 from Paris Lat 52 23 N Long 4 50 E

AMSTERDAM, an uninhabited island in the Frozen sea, near the west coast of Spitzbergen

AMSTERDAM, an island in the Indian sea Lat 37 55 S Long 75 17 E

AMSTERDAM, or TONGATABOO, an island in the South Pacific ocean Lat 21 9 S Long 174 46 W

AMTRUSTIO, in old charters, a liege tenant of the ancient French or German kings

AMULET, AMULETUM, a kind of external medicament, to be worn about the neck, or other part of the body, to prevent, or remove, diseases The word amulet is formed from αμυνω, *to protect* Such are quills of quicksilver, or arsenic, which some hang on the neck or wear under the shirt, against the plague, and other contagious diseases, as also the blood-stones worn by others against hæmorrhages and that worn by the women of the East Indies to bring the menses Amulets are also frequently no other than a sort of spells or charms, consisting of quaint words and characters supposed to have the virtue of warding off ill Pliny makes frequent mention of them

AMUND anciently a person freed from wardship

AMURCA, in pharmacy, a medicine made of the refuse or recrement of expressed olives

To AMUSE *v a* (*amuser* Fr) 1 To entertain with tranquillity (*Walsh*) 2 To draw on from time to time

AMUSEMENT *s* (*amusement* Fr) That which amuses, entertainment (*Rogers*)

AMUSER *s* (*amuseur*, Fr) He that amuses

AMUSIVE *a* (from *amuse*) That has the power of amusing (*Thomson*)

AMUTICA, AMUTICS (αμυτικα, from αμυττω, *to scratch*) Medicines, that by vellicating or scratching as it were the bronchia, stimulate it to the discharge of whatever is to be thrown off the lungs

AMYCTICA, AMYCTICS (from αμυττω) The same as AMUTICS, which see

AMYGDALA (*amygdala* αμυγδαλον, from αμυσσω, *to lancinate*, so called because after the green husk is removed from the fruit, there appear upon the shell certain fissures, as it were lacerations) Almonds The kernels of the fruit of the almond tree, amygdalus communis of Linnéus Class icosandria, order monogynia A native of Greece The same tree produces either bitter or sweet almonds

Sweet almonds are more in use as food than medicine They afford, on expression, a great proportion of oil, which, from being more agreeable to the palate than the other oils, is preferred for internal use, to soften and relax the solids, in tickling coughs, hoarseness, costiveness, nephritic pains, &c Externally it is used in tensions and rigidities of particular parts An emulsion of sweet almonds possesses the emollient qualities of the oil See AMYGDALUS

AMYGDALÆ The almonds of the ears See TONSILS

AMYGDALÆ AMARÆ See AMYGDALA

AMYGDALÆ DULCES See AMYGDALA

AMYGDALINE a (*amygdala*, Lat) Resembling almonds

AMYGDALITES Almond-stone A genus of the class earths, order aggregate consisting of various rounded or elliptical stones of different sizes, imbedded together, and forming an irregular mass, occurring principally in mountains of a later date, and generally mouldering when exposed to the air Fifty-five species which may be subdivided into those, A, with a talcose base, B with a calcareous base, C, with an argillaceous base D, with a siliceous base The subdivision C is by far the most numerous and in this is to be arranged the a vulgaris, amygdaloid, or common almond-stone composed of trap and spar, found in Derbyshire, and other parts of Britain in Italy Saxony Bohemia Hungary, &c in stratified mountains and is often the matrix of agate and chalcedony the spar is always white, with sometimes a coating of green alumine the glandules are larger or less, and more or less thickly dispersed through the mass which is red brown grey or black There is likewise often an admixture of mica, green alumine or feldspar

AMYGDALUS Almond-tree A genus of the class and order icosandria monogynia Calyx inferior, five-cleft petals five, drupe with a nut perforated by pores There are seven species in different parts of Europe, Asia, and Africa of which the following are chiefly entitled to notice 1 a Persica with a downy skin, peach, 2 a Persica, with a glabrous skin nectarine both these varieties, as their specific name imports, are natives of Persia, 3 a communis, common almond, which includes both the sweet and the bitter almond trees, and are natives of Greece

AMYGDALUS COMMUNIS The systematic name of the plant which affords both sweet and bitter almonds See AMYGDALA

AMYGDALUS PERSICA The systematic name of the common plum tree See AMYGDALUS

AMYLA (from *amylum*, starch) Any sort of chemical feculence, or finely pulverised residuum

AMY'LEON, AMY'LION See AMYLUM

AMYLON, in old writers, an aliment, it is supposed to be much like our firmity

AMYLUM (*amylum*, αμυλον, from α priv and μυλη, *a mill*, because it was formerly made from wheat without the assistance of a mill) Starch The white substance which subsides from the water that is mixed with wheaten flour The starch-manufacturers suffer it to remain in the water for a time after it has become acid, which makes it very white and soft to the touch, and scarcely sensible to the taste Starch is frequently employed medicinally in clysters against diarrhœas Externally surgeons apply it as an absorbent in erysipelas

AMYNTA, in literary history, a beautiful pastoral comedy, composed by Tasso, the model of all dramatic pieces wherein shepherds are actors The Pastor Fido, and Filli di Sciro, are only copies of this excellent piece

AMYNTOR, αμυντωρ, formed of the verb αμυνω, *I defend* or *avenge*, properly denotes a person who defends or vindicates a cause In this sense, Mr Toland entitles his defence of Milton's life, amyntor is being a vindication of that work against Mr Blackhall and others

AMYRALDISM, a name given by some writers to the doctrine of universal grace as explained and asserted by Amyraldus, or Moses Amyrault, and others his followers, among the reformed in France, towards the middle of the seventeenth century

AMYRIS In botany a genus of the class and order octandria monogynia Calyx four-toothed, petals four, oblong, stigma four-sided, berry drupaceous Nineteen species have been collected in Asia Africa, and America, almost all of which produce a considerable quantity of terebinthinate rosin or balsam, and several of them of a very grateful taste or flavour The following are chiefly worthy of notice 1 a elemifera, yielding the officinal gum-elemi, 2 a gileadensis, balsam of Gilead-tree, balsam of Mecca or Turkey-tree, so called from its yielding this gum, 3 a toxifera, poison ash, yielding a liquid gum as black as ink, 4 a balsamifera, rose-wood, an elegant and odoriferous Jamaica tree, of late much and deservedly esteemed by our cabinet-makers A toxifera though poisonous to animals in general, affords a fruit that is nutritive to one or two species of the loxus or grosbeak, which feed on it with great glee

AN *article* (ane, Saxon) 1 One, but with less emphasis, as, an ox 2 Any, or some, as, an elephant might swim in this water

ANA (ανα) In medicinal prescriptions, means *of each*, and is generally contracted into aa, or ā

ANA, in matters of literature, a Latin termination adopted into the titles of several books in other languages Anas or books in ana, are collections of the memorable sayings of persons of learning and wit, much the same with what we otherwise call table-talk Wolfius has given the history of books in ana, in the preface to the Casauboniana

ANABAPTISM See ANABAPTISTS, *infra*

ANABAPTISTON See ABAPTISTON

ANABAPTISTS, a name given to Christians, who maintain that baptism ought always to be performed by immersion, that it ought not to be administered to children before the age of discretion, or that at this age it ought to be re-administered to those who have been baptised in their infancy because, they say, the administration of this sacrament is neither valid nor useful, if it be done by sprinkling only, and not by immersion, or if the persons who receive it be not in a condition to give the reasons of their belief

The word anabaptist is compounded of *ανα*, *again*, and *βαπτιζω*, *to baptize*, and this general denomination has been indiscriminately applied to persons of very different principles and practices, though many of them object justly to the name, and hold nothing in common, excepting some or other of the abovementioned opinions concerning baptism

The Novatians, the Cataphrygians, and the Donatists, may be considered as a kind of anabaptists in the earlier ages, though not then denoted by this name, for they contended, that those Christians of the catholic church, who joined themselves to their respective parties, should be re-baptised But we must not class under the same denomination those bishops of Asia and Africa, who, in the third century, maintained, that baptism, administered by those whom they called heretics, was not valid, and therefore that such of them as returned into their churches ought to be re baptised Nor do the English and Dutch Baptists consider the denomination as at all applicable to their sect by whom the baptism appointed by Christ is held to be "nothing short of immersion, upon a personal profession of faith, of which profession infants being incapable, and sprinkling being no adequate symbol of the thing intended, the baptizing of proselytes to their communion, who in their infancy had undergone the ceremony of sprinkling, cannot, it is urged, be interpreted a repetition of the baptismal ordinance

Anabaptists, in a strict and proper sense, appear to be those who not only re-baptize, when they arrive at an adult age, persons that were baptized in their infancy, but also, as often as any person comes from one of their sects to another, or as often as any one is excluded from their communion and again received into the bosom of their church, they baptize him And such were many of the German Baptists But the single opinion common to all the sects to which the name of Anabaptist has been indiscriminately applied, is that of the invalidity of infant baptism, in whatever way administered And hence the general denomination of Antipædobaptists, which includes Anabaptists, Baptists, Mennonites, Waterlandians &c as distinguished by their respective peculiarities

The term Anabaptists was first applied to a protestant sect which sprung up in Germany immediately after the Reformation It was founded in the year 1521, by Nicholas Storck, Mark Stubner, and Thomas Muncer, who had been followers of Luther, but abandoned him on pretence that his doctrine was imperfect Storck being a man of no learning, boasted of inspirations, Stubner, who had wit and some learning, applied himself to find out suitable explications of the word of God, and Muncer, who was bold and zealous, played the enthusiast in the most extravagant manner

The most prominent of their religious tenets related to the sacrament of baptism, which, as they contended, ought to be administered only to persons grown up to years of understanding, and should be performed not by sprinkling them with water, but by dipping them in it for this reason they condemned the baptism of infants, and baptizing all whom they admitted into their society, the sect came to be distinguished by the name of Anabaptists To this peculiar opinion concerning baptism, which certainly appears founded on the practice of the church in the apostolic age, and contains nothing inconsistent with the peace and order of human society they added other principles of a most enthusiastic as well as dangerous nature They maintained, that among Christians, who had the precepts of the gospel to direct, and the spirit of God to guide them, the office of magistracy was not only unnecessary, but an unlawful encroachment on their spiritual liberty, that the distinctions occasioned by birth, or rank, or wealth, being contrary to the spirit of the gospel, which considers all men as equal, should be entirely abolished, that all Christians, throwing their possessions into one common stock, should live together in that state of equality which becomes members of the same family, that as neither the laws of nature, nor the precepts of the New Testament, had placed any restraint upon men with regard to the number of wives which they might marry, they should use that liberty which God himself had granted to the patriarchs

By these doctrines they soon drew over vast numbers to their side, insomuch that Muncer ventured openly to exhort the people to resist the magistrates, and constrain princes to divest themselves of their authority This, as might naturally be expected, produced considerable tumults and insurrections, and particularly in the bishopric of Munster, where a civil war was carried on for a long period The sect became very prevalent in Munster, where Boccold their leader, who had acquired great ascendancy over the multitude, set up a dominion under the title of the kingdom of the Anabaptists The monarch, however, was at length taken and put to death by torture, with him ended the kingdom All who are at all acquainted with the peculiar tenets which distinguish the different sects in Great Britain, must be perfectly aware that those among us

who are advocates for the baptism of adults and by immersion, hold in abhorrence the wildly enthusiastic and dangerous sentiments of Storck and Muncer: surely then it would be no great stretch of liberality and candour, to relinquish the application of the term Anabaptist to them, a term which indirectly reproaches them with speculations and practices upon which no Christians can look with greater detestation than the majority of modern Baptists. See Baptists.

ANABASII, in antiquity, couriers who travelled in horses or in chariots, with important dispatches.

ANABASIS. Berry bearing glass-wort. A genus of the class and order pentandria digynia. Calyx three-leaved; corol five petalled; berry one-seeded, surrounded by the calyx. There are five species, chiefly in Siberia and on the Caspian shores.

Anaba'sis (from αναβαινω, *to ascend*.) An increase or augmentation of a disease or paroxysm.

ANABATHRA, an ancient contrivance, similar to what we now call a horseblock. In a general sense it denoted steps by which persons ascended any eminence.

ANABEXIS (αναβηξις, from αναβηττω, *to cough up*.) An extension or expectoration of mucus by coughing.

ANABOA, a small island on the coast of Loango in Africa. Lat. 1 N. Long. 8. 30 E.

ANABOLÆUM, in antiquity, a kind of upper coat.

ANABOLEUS, in antiquity, an equerry.

ANACALYPTERIA, according to Suidas, presents made to a bride by her husband's friends, when she first appeared publicly before men.

ANACAMPTICK. a. (ανακαμπτω.) Reflecting, or reflected.

ANACAMPTICKS. s. The doctrine of reflected light; catoptricks.

ANACAMPTOS, a term used by the ancient Greeks to signify a course of retrograde or reflected notes. Anacamptic notes were also those which proceeded downwards, or from acute to grave. Anacamptos, taken in this sense, was the contrary of euthia.

ANACARDIUM. Cashew-nut, or acajou. A genus of the class and order enneandria monogynia. Calyx five parted; petals five, reflected; anthers nine, with a tenth barren one; nut kidney-shaped, seated on a fleshy receptacle. There is but one species known, which is a native tree of India, and entitled a. occidentale. It grows naturally to the height of twenty feet, and bears a fruit about the size of an orange, filled with a pleasant acid juice, often employed in making punch. The nut of the plant grows at the apex of the fruit, the oil of which is an active caustic, and employed as such in its native country; but neither it, nor any part of the fruit, is used medicinally in this country.

Anaca'rdium orienta'le. Malaca bean. The fruit or nut so called in old pharmacopœias is of a shining black colour, heart-shaped, compressed, and about the size of the thumb nail. It is the produce of a different plant from the systematic anacardium; but is of no medicinal efficacy, and now deservedly forgotten in this country.

ANACATHARSIS (*anacatharsis*, ανακαθαρσις, from ανα and καθαιρομαι, *to purge up*.) An expectoration of mucus or pus.

ANACATHARTICS (from *anacatharsis*.) Medicines which promote expectoration or the excretion of humours from the lungs or bronchia.

ANACEIA, an Athenian festival in honour of the Dioscuri.

ANACEPHALÆOSIS, in rhetoric, a recapitulation of the heads of a discourse.

ANACHARSIS, a Scythian philosopher, travelled to Athens in the time of Solon, by whom he was greatly esteemed. He was the only stranger the Athenians ever admitted to the honour of citizenship. Crœsus invited him to Sardis, with the offer of riches, but he replied, "that he came to Greece for improvement, and not for money." After a long stay in Greece, he returned to Scythia, where he attempted to introduce the customs and institutions of Greece, which brought upon him the enmity of his countrymen. Going one day into a wood, to perform a sacred rite to the goddess Cybele, he was shot with an arrow by the king himself. Many of his apophthegms are preserved by Lælius, who wrote his life, by Plutarch and others. An Athenian once reproaching him with being a Scythian: "True, says Anacharsis, "my country is a disgrace to me, but you are a disgrace to your country." He flourished about 592 years before the Christian era.

ANACHORET, Anachorite. s. (αναχωρητης.) A monk who leaves the convent for a more austere and solitary life.

ANACHORITA, in ecclesiastical writers, a name sometimes given to the cells of recluses. By the ancient canons, no anachorita could be erected without consent of the bishop.

ANACHRONISM, in chronology, an error in computation of time, whereby an event is placed earlier than it really happened. When a fact is placed lower and later than it should be, the error is called a parachronism.

ANACLASTIC CURVE, the same as Curve reflectoire, which see.

Anaclastic glasses, a kind of sonorous phials or glasses, chiefly made in Germany, which have the property of being flexible, and emitting a vehement noise by the human breath. These glasses are a low kind of phials with flat bellies, resembling inverted funnels, whose bottoms are very thin, scarce surpassing the thickness of an onion peel. This bottom is not quite flat, but a little convex; but upon applying the mouth to the orifice, and gently inspiring, or as it were sucking out the air, the bottom gives way with a prodigious crack, and from convex becomes concave. On the contrary, upon exspiring or

breathing gently into the orifice of the same glass, the bottom with no less noise bounds back to its former place, and becomes gibbous as before

ANACLASTICS, the same as DIOPTRICS

ANACLETERIA, a solemn festival celebrated by the ancients, when their kings assumed the reins of government

ANACLETICUM, anciently, a rallying blast of a trumpet, to recall the flying soldiers

ANACLINOPALE, in antiquity, a strange kind of wrestling, in which the weaker was sometimes victorious

ANACLINTERIA, in antiquity, a kind of pillows on the dying bed, whereon the guests leaned

ANACREMPSIS (from αναχρεμπτομαι, *to hawk up*) Expectoration

ANACREON, a Greek lyric poet, was born at Teos in Ionia, about the sixth century B C He was entertained at the court of Polycrates at Samos, who held him in great esteem At the invitation of Hipparchus, son of Pisistratus, he visited Athens, and on the death of that prince, he returned to Teos, and remained there till the revolt of Histæus, when he removed to Abdera, where he was choaked, while drinking, by a grape-stone, at the age of 85, after a life of much dissipation and intemperance His statue was placed in the citadel of Athens, representing him as an old drunken man revelling He was shamefully attached to a youth called Bathyllus His poems are amatory and bacchanalian, but only few of them remain The best editions of Anacreon are those of Barnes, Pauw, and the splendid ones of Spalletti in 1781 and 1783 An elegant translation of Anacreon into English was published by Francis Fawkes, A M His odes are pretty well characterized by Cowley, when he says, in the character of Cupid,

"All thy verse is softer far
Than the downy feathers are
Of my wings, or of my arrows,
Of my mother's doves and sparrows
Graceful, cleanly, smooth or round
All with Venus girdle bound

A translation of these odes was published in 1801, by Thomas Moore, esq

ANACREONTIC This derivative from the name of Anacreon, is sometimes placed at the beginning of convivial songs, glees, and festive odes, especially when they include the celebration of the grape, and denotes a gay hilarity of movement, and a free and easy style of performance

ANACREONTIC VERSE, in ancient poetry, a kind of verse, so called from its being much used by the poet Anacreon It consists of three feet and a half, usually spondees and iambuses, and sometimes anapests such as that of Horace, Lydia, dic per omnes

ANACRISIS, a kind of examination, which the Athenian archons went through before their admission into office

ANACROSIS, in antiquity, the first part of the Pythian song

ANACHRON Natron, or soda See ANATRON

ANACYCLUS In botany, a genus of the class and order syngenesia polygamia superflua Receptacle chaffy, seeds crowned with an emarginate margin, those of the ray membranaceous at the sides It embraces five species, all of which are natives of the Mediterranean shores

ANADEMA, a head ornament wherewith victors at the ancient games, were decorated

ANADIPLOSIS s (αναδιπλωζις) Reduplication, a figure in rhetoric, in which the last word of a line or clause is repeated in the beginning of the next Thus the apostle,

If children, then heirs, heirs of God, &c.

ANADIR, a considerable river of Siberia, that falls into the Eastern ocean

ANADYSIS, among ancient divines, denotes the emersion in baptism

ANAEDIA, in antiquity, a silver stool placed in the areopagus, on which the person accused was seated for examination

ANÆNOMA (from αναινομαι, *to refuse*) In medicine, a refusal or inability in any member of the body to perform its function

ANÆSTHESIA (*anæsthesia*, αναισθησια, from α priv and αισθανομαι, *to feel*) Loss of the sense of touch A genus of diseases in the class locales, and order dysæsthesiæ of Cullen

ANAGALLIS Pimpernel A genus of the class and order pentandria monogynia Corol wheel-shaped, capsule opening transversely all round, stamens hairy It has six species, two of which only are natives of our own country, a arvensis the common pimpernel of the fields, and a tenella, found occasionally in our fens and marshes

ANAGLYPHA, in antiquity, vessels adorned with sculpture in basso relievo

ANAGLYPHE (from αναγλυφω, *to engrave*) A part of the fourth ventricle of the brain so called from its resemblance to a pen or style

ANAGNOSTES, or ANAGNOSMATA (from ανα and γινωσκω *I know*) In the Greek church, denotes an ecclesiastical book, containing the lessons read at divine service in the several feasts, &c of the year

ANAGNOSTA, in antiquity a literary servant who read to persons of distinction during their meals

ANAGOGETICAL *a* (αναγωγη) That contributes or relates to spiritual elevation

ANAGOGICAL, signifies mysterious, transporting, and is used to express whatever elevates the mind, not only to the knowledge of divine things, but of divine things in the next life This word is seldom used, but with regard to the different senses of scripture

ANAGOGY, or ANAGOGE, among ecclesiastical writers, the elevation of the mind to things celestial and eternal It is particularly used where words in their natural or primary meaning denote something sensible, but

have a further view to something spiritual or invisible

ANAGRAM (from ανα, *backwards*, and γραμμα, *letter*) In matters of literature, a transposition of the letters of some name, whereby a new word is formed, either to the advantage or disadvantage of the person or thing to which the name belongs Thus the anagram of Galenus is angelus, that of Logica, caligo, that of Alstedius sedulitas, &c Calvin, in the title of his Institutions, calls himself Alcuinus, which is the anagram of Calvinus, and the name of an eminently learned person in the time of Charlemagne

Those who adhere strictly to the definition of an anagram, take no other liberty than that of omitting or retaining the letter h at pleasure, whereas others make no scruple to use e for æ, v for w, s for z, and c for k, and vice versa But besides anagrams formed as above, we meet with another kind in ancient writers, made by dividing a single word into several, thus, sus tinea mus, are formed out of the word sustineamus Anagrams are sometimes also made out of several words such is that on the question put by Pilate to our Saviour, quid est veritas? whereof we have this admirable anagram, vir est qui adest

ANAGRAMMATIST, a maker or composer of anagrams Thomas Billon a Provençal, was a celebrated anagrammatist, and retained by Lewis XIII with a pension of 1200 livres, in quality of anagrammatist to the king

ANAGRAMMATIZE *v n* To make anagrams

ANAGRAPHE (αναγραφη, from ανα and γραφω *to write*) A receipt or prescription in medicine

ANAGYRIS Bean trefoil A genus of the class and order decandria monogynia Corol papilionaceous, with the standard and wings shorter than the keel, stigma villous, legume oblong roundish many-seeded The only known species is a native of Italy

ANAISTHESIA (αναισθησια) ANÆSTHESIA, which see

ANAIXESIS (αναιξησις, from αναισσω, *to rush back*) In medicine, a return of a disorder or paroxysm

ANAL, the fin which, in fishes, is placed between the vent and tail, and expands perpendicularly

ANALECTA, in antiquity, a servant who gathered up the offals of tables

ANALECTA, is likewise used in a literary sense, for a collection of small pieces or compositions

ANALEMMA, a planisphere, or projection of the sphere, orthographically made on the plane of the meridian, by perpendiculars from every point of that plane, the eye supposed to be at an infinite distance, and in the east or west point of the horizon In this projection, the solstitial colure, and all its parallels, are projected into concentric circles, equal to the real circles in the sphere, and all circles whose planes pass through the eye, as the horizon and its parallels, are projected into right lines equal to their diameters, but all oblique circles are projected into ellipses, having the diameter of the circle for the transverse axis

This instrument, having the furniture drawn on a plate of wood or brass, with a horizon fitted to it, is used for resolving many astronomical problems, as the time of the sun's rising and setting, the length and hour of the day &c It is also useful in dialling for laying down the signs of the zodiac, with the lengths of days, and other matters of furniture, upon dials

ANALEPTICK *a* (αναληπτικος) Comforting, corroborating (*Quincy*)

ANALEPTICS (*analeptica, medicamenta*, αναληπτικα, from αναλαμβανω, *to recruit, to recover*) Substances used for food and medicine which are calculated, from their properties, to restore strength when impaired by sickness

ANALGESIA (αναλγησια from α priv and αλγος, *pain*) Indolence, privation of pain or trouble The disease called by Hippocrates rathymia, or paresis

ANALOGAL *a* (from *analogous*) Analogous, having relation (*Hale*)

ANALOGICAL *a* (from *analogy*) 1 Used by way of analogy (*Watts*) 2 Analogous, having resemblance (*Hale*)

ANALOGICALLY *ad* (from *analogical*) In an analogical manner, in an analogous manner (*Cheyne*)

ANALOGICALNESS *s* (from *analogical*) The quality of being analogical

ANALOGISM *s* (ἀναλογισμος) An argument from the cause to the effect

To ANALOGIZE *v a* (from *analogy*) To explain by way of analogy (*Cheyne*)

ANALOGY, in philosophy, a certain relation and agreement between two or more things which in other respects are entirely different There is likewise an analogy between beings that have some conformity or resemblance to one another, for example between animals and plants, but the analogy is still stronger between animals of two different species

Analogy enters into all our reasoning, and serves to explain and illustrate A great part of our philosophy, indeed, has no other foundation It is natural to mankind to judge of things less known, by some similitude, real or imaginary, between them and things more familiar or better known And where the things compared have really a great similitude in their nature, when there is reason to think that they are subject to the same laws, there may be a considerable degree of probability in conclusions drawn from analogy

According to professor Castillon of Berlin, the principal uses of analogy in the investigation of physical and moral truth, may be reduced to these four 1 By means of our senses to improve, first our own judgment, and afterwards that of others, with respect to intellectual subjects 2 To deduce a general from a particular truth Having discovered and proved

the truth of a proposition with respect to any particular object, examine whether this truth flows from a quality peculiar to this single object, or common to several objects In the latter case all these objects may be comprehended under one general idea, founded on their common quality Substitute this general idea instead of the particular object, and the proposition will become general, without ceasing to be true, because whatever evidently and solely results from the identity, on which an analogy is founded, must necessarily be true with respect to all those objects in which the analogy is the same 3 To prove the truth or falsehood of propositions which cannot be otherwise demonstrated 4 To discover new truths in both natural and moral philosophy

That analogical reasoning from a supposed similitude of mind to body, which appears to be the most fruitful source of error with regard to the operations of our minds, may be illustrated by the following instance When a man is urged by contrary motives, those on one hand inciting him to do some action, those on the other to forbear it, he deliberates about it, and at last resolves to do it, or not to do it The contrary motives are here compared to the weights in the opposite scales of a balance, and there is not perhaps any instance that can be named of a more striking analogy between body and mind Hence the phrases of weighing motives, of deliberating upon actions, are common to all languages From this analogy, some philosopher draw very important conclusions They say, that, as the balance cannot incline to one side more than the other, when the opposite weights are equal, so a man cannot possibly determine himself if the motives on both hands are equal, and as the balance must necessarily turn to that side which has most weight, so the man must necessarily be determined to that hand where the motive is strongest And on this foundation some of the schoolmen maintained, that if a hungry ass were placed between two bundles of hay equally inviting, the beast must stand still and starve to death, being unable to turn to either, because there are equal motives to both This is an instance of that analogical reasoning, which, it is conceived, ought never to be trusted, for the analogy between a balance and a man deliberating, though one of the strongest that can be found between matter and mind, is too weak to support any argument A piece of dead inactive matter, and an active intelligent being, are things very unlike, and because the one would remain at rest in a certain case, it does not follow that the other would be inactive in a case somewhat similar The argument is no better than this, that, because a dead animal moves only as it is pushed, and, if pushed with equal force in contrary directions, must remain at rest, therefore the same thing must happen to a living animal, for surely the similitude between a dead animal and a living, is as great as that between a balance and a man.

Analogy, among grammarians, is the correspondence which a word or phrase bears to the genius and received forms of any language

Analogy, in mathematics, the same as proportion, or equality, or similitude of ratios

ANALYSIS (from ἀναλύω, *to resolve*) In a general sense, is the resolution of something compounded into its constituent parts, or first elements

Analysis, in chemistry, the decomposition of a body, or the separation of the constituent parts of a compound substance Chemistry furnishes several means for the decomposition of bodies These means are all founded on the differences of the properties belonging to the various principles of which the body to be analysed is composed Analysis, and synthesis or combination, are the two great processes by which the purposes of chemistry are accomplished Analysis is performed either by fire or by menstrua, the first is employed upon bodies whose constituent particles possess different degrees of volatility— the most volatile parts are first separated by a graduated heat, in distilling vessels, and then the parts which are next in volatility will pass over in distillation, while those parts which are fixed, and capable of resisting the action of fire, remain at the bottom of the vessel The second method of analysis which is far more perfect and correct than the former, and is frequently used to supply its defects, is founded upon the different degrees of solubility which the different particles possess of which the bodies are composed, and of their affinity for each other This method is of excellent use for separating, without alteration, the proximate principles of many vegetable and animal substances, which the former method is incapable of effecting Frequently, however, the two methods are used in conjunction

Analysis, in general, is divided by Fourcroy into two kinds, the true or simple, and the false or complex The true analysis is that by which the component principles of the body decomposed are obtained, without suffering any alteration The only criterion by which we can distinguish whether this analysis has taken place, is when, by reuniting the simple substances to which the compound body has been reduced, we can form a new compound precisely similar to the former Cinnabar will furnish an instance of this, for when the two substances of which it is formed are separated, they are found to be in a state of purity similar to that which they possessed before their separation, and by uniting them, a new body is composed, differing in no respect from the original cinnabar (See **Synthesis**) This kind of analysis, however, can seldom be effected the neutral salts, and a few other mineral substances, are the only bodies in nature susceptible of this species of decomposition The false or complex analysis is that by means of which a body is resolved into principles different from those which appeared to exist in the composition, and incapable of forming by their reunion, a body similar to that

from which they were obtained This kind of decomposition takes place in most of the bodies that are subject to a chemical analysis, no other condition being requisite than that more than two principles enter into the combination to be examined, and that they be united by a certain degree of mutual affinity Many minerals, and all vegetable and animal substances without exception, admit of no other species of analysis Thus sugar, distilled in a retort, affords an acid, an oil, and a carbonaceous residue, but all attempts to recombine these into sugar are uniformly fruitless This kind of analysis cannot enable us to discover in what state substances exist together in any combination before being separated, and it therefore affords but little useful information, and is not to be trusted without the greatest caution By confiding too hastily in results of this kind, chemists have afforded room for all that censure to which their art has been exposed, and on this account has chemistry been accused of absolutely destroying bodies in its attempts to separate their component parts, but, becoming more circumspect in proportion to her progress, chemistry now rejects that deceitful analysis to which she formerly had recourse, and possesses the means of examining the properties, and distinguishing the component principles of bodies, without destroying their nature Elements of Chemistry, v 1 p 3.

To pursue this subject to its full length, would be to detail many of the experiments, and most of the facts, in chemistry, which in this place would not only exceed our limits, but conduce to no good purpose, as its principles will be apparent in the several articles of this work which treat of the various processes, and the substances about which they are employed

For the general method of analysing ANIMAL MATTER we refer to that article, of vegetables, to VEGETABLE MATTER, of minerals in general, to MINERAL ANALYSIS, of mineral waters, to WATERS MINERAL

ANALYSIS OF SOILS See SOIL and HUSBANDRY

ANALYSIS, in mathematics, is the method of resolving problems, and may be distinguished into the ancient and the modern

The ancient analysis is the method of proceeding from the thing sought as taken for granted, through its consequences, to something that is really granted or known, in which sense it is the reverse of synthesis or composition, in which we lay that down first which was the last step of the analysis, and tracing the steps of the analysis back, making that antecedent here which was consequent there, till we arrive at the thing sought which was taken or assumed is granted in the first step of the analysis This chiefly respected geometrical enquiries

The principal authors on the ancient analysis, as recounted by Pappus, in the 7th book of his Mathematical Collections, are Euclid in his Data, Porismata, & de Locis ad Superficiem, Apollonius de Sectione Rationis, de Sectione Spatii, de Tactionibus, de Inclinationibus, de Locis Planis, & de Sectionibus Conicis, Aristæus, de Locis Solidis, and Eratosthenes, de Mediis Proportionalibus from which Pappus gives many examples in the same book To these authors we may add Pappus himself The same sort of analysis has also been well cultivated by many of the moderns, as Fermat, Viviani, Getaldus, Snellius, Huygens, Simpson, Stewart, Lawson, &c. and more especially Hugo d'Omerique, in his Analysis Geometrica, in which he has endeavoured to restore the Analysis of the ancients And on this head, Dr Pemberton tells us "that sir Isaac Newton used to censure himself for not following the ancients more closely than he did, and spoke with regret of his mistake, at the beginning of his mathematical studies, in applying himself to the works of Descartes, and other algebraical writers, before he had considered the Elements of Euclid with that attention so excellent a writer deserves that he highly approved the laudable attempt of Hugo d'Omerique to restore the ancient analysis

In the application of the ancient analysis to geometrical problems, every thing cannot be brought within strict rules, nor any invariable directions given, by which we may succeed in all cases, but some previous preparation is necessary, a kind of mental contrivance and construction, to form a connexion between the data and quæsita, which must be left to every one's fancy to find out, being various, according to the various nature of the problems proposed right lines must be drawn in particular directions, or of particular magnitudes, bisecting perhaps a given angle, or perpendicular to a given line, or perhaps tangents must be drawn to a given curve, from a given point; or circles described from a given centre, with a given radius, or touching given lines, or other given circles, or such-like other operations Whoever is conversant with the works of Archimedes, Apollonius, or Pappus, well knows that they founded their analysis upon some such previous operations, and the great skill of the analyst consists in discovering the most proper affections on which to found his analysis for the same problem may often be effected in many different ways, and that which leads to the conclusion by the most obvious and satisfactory steps, is the one which ought to be adopted

Modern Analysis, consists chiefly of algebra, arithmetic of infinites, infinite series, increments, fluxions, &c, of each of which a particular account may be seen under their respective articles

These form a kind of arithmetical and symbolical analysis, depending partly on modes of arithmetical computation, partly on rules peculiar to the symbols made use of, and partly on rules drawn from the nature and species of the quantities they represent, or from the modes of their existence or generation

The modern analysis is a general instrument by which the finest inventions and the greatest improvements have been made in mathematics

and philosophy, for near two centuries past It furnishes the most perfect examples of the manner in which the art of reasoning should be employed, it gives to the mind a wonderful skill for discovering things unknown, by means of a small number that are given, and by employing short and easy symbols for expressing ideas, it presents to the understanding things which otherwise would seem to be above its sphere By this means geometrical demonstrations may be greatly abridged a long train of arguments, in which the mind cannot, without the greatest effort of attention, discover the connection of ideas, is converted into visible symbols, and the various operations which they require, are simply effected by the combination of those symbols And, what is still more extraordinary, by this artifice a great number of truths are often expressed in one line only instead of which, by following the ordinary way of explanation and demonstration, the same truths would occupy whole pages or volumes And thus, by the bare contemplation of one line of calculation, we may understand in a short time whole sciences, which otherwise could hardly be comprehended in several years

From a comparison of the peculiar natures of the ancient and modern analysis, it results, that the ancient method may, in some respects, be regarded as more perspicuous than that of the moderns though the latter be far superior to it in point of dispatch and facility of invention That the former is the most proper for one who is entering upon mathematical pursuits, as it will accustom him to a pure, clear, and accurate mode of investigation, and demonstration but that the modern analysis should be recommended to his attention, as soon as proper habits of reasoning are established because he may thereby be enabled to extend his views, and to strike out new improvements and discoveries

Or, adopting the conclusion of Mr Woodhouse's judicious reflections on this subject, we may say, that, "If mental discipline and recreation are sought for, they may be found in both methods, neither is essentially inaccurate, and, although in simple enquiries the geometrical has greater evidence, in abstruse and intricate investigations the analytical is most luminous but, if the expeditious deduction of truth is the object, then the analytical calculus ought to be preferred To arrive at a certain end, we should surely use the simplest means, and there is little to praise or emulate in the labours of those who resolutely seek truth through the most difficult paths, who love what is arduous because it is arduous, and, in subjects naturally difficult, toil with instruments the most incommodious Phil Trans 1802, part I

Residual Analysis, a branch of the algebraic art, invented by the late Mr John Landen, and applied to the solution of those problems which have of late been more generally solved by the doctrine of fluxions. This method was called the residual analysis, because, in all cases where it is made use of, the conclusions are obtained by means of residual quantities In this analysis a geometrical or physical problem is reduced to another purely algebraical, and the solution is then obtained, without any supposition of motion, and without considering quantities as composed of infinitely small particles.

The residual analysis proceeds by taking the difference of the same function of a variable quantity in two different states of that quantity, and expressing the relation of this difference to the difference between the two states of the said variable quantity itself This relation being first expressed generally, is then considered in the case when the difference of the two states of the variable quantity is $=0$

Mr Landen published the 1st book of his Residual Analysis in 1764, and therein exemplified its usefulness, in several algebraic enquiries, and in determining the tangents, evolution, ordinates, points of contrary flexure, double and triple, &c points, asymptotes, centers, &c of curve lines In the 2d book it was intended to shew the application of this analysis in a variety of mechanical and physico-geometrical enquiries but that book was never published.

Analysis of powers, is the same as resolving them into their roots, and is otherwise called evolution

Analysis of curve lines, shews their constitution, nature and properties

Analysis and Synthesis, as opposed the one to the other, have been so ably developed by Pappus, in the 7th book of his Mathematical Collections above mentioned, that we are persuaded a translation of the passage will be interesting to our scientific readers

The analysis, says that celebrated geometer, is the way by which we proceed from the thing demanded, granted for the moment, till we have connected it by a series of consequences with something anteriorly known, or placed it among the number of principles known to be true This method, therefore, enables us to rise from a truth or a proposition to its antecedent, and we call it analysis or resolution, because it is a solution in an inverted sense In the synthesis, on the contrary, we proceed from the proposition which is found last in the analysis, disposing regularly according to their nature, the antecedents which were above presented as consequents, and combining them respectively until we arrive at the proposed object where we had commenced the operation in the former case

We distinguish two kinds of analysis in the one which may be named contemplative, it is proposed to ascertain the truth or the falsity of a proposition advanced the other is referred to the solution of problems, or to the investigation of unknown truths In the first, we assume as true or as previously existing the subject of the proposition advanced, and proceed by the consequences of the hypothesis to something known, and if the result be thus found true, the proposition

advanced is likewise true The direct demonstration is afterwards formed, by taking up again in an inverted order the several parts of the analysis If the consequence at which we arrive in the last place is found false, we thence conclude that the proposition analysed is also false When a problem is under consideration, we first suppose it resolved, and then pursue the consequences thence derived until we come to something known If the ultimate result thus obtained be comprised in what the geometers call data, the question proposed may be resolved, the demonstration (or rather the construction) is also constituted by taking the parts of the analysis in an inverted order The impossibility of the last result of the analysis will prove evidently in this case as well as in the former, that of the thing required

There is, besides, in the solution of every problem, that which is called the determination, that is to say, the part of the reasoning by which it is shewn when, how, and in how many ways, the problem may be resolved

We trust that, after duly considering the preceding extract, but little will be necessary to render the characters of mathematical synthesis and analysis sufficiently evident In the former method, the proposition enunciated is always the ultimate consequence of the series of reasonings which constitute the demonstration it is, in fact, a composition, for we go from principle to principle, until we arrive at that consequence In the analysis, on the contrary, by supposing the question resolved, we embrace the subject proposed in its aggregate, and it is by causing it to pass through different forms, or by giving, so to speak, various translations of the same enunciation, that we arrive at the solution required

Similar methods of investigating truth may be adopted in other sciences Condillac, in the fourth volume of his Cours d'Etudes, shews that the whole art of reasoning consists merely in discovering the identity of several propositions it is the order according to which the propositions are connected which constitutes the method Thus, when we reason synthetically, all the propositions of which we make use are identical up to the last, which is itself a consequence of the preceding and which if it comprises the subject of the enunciation, shews that the proposition advanced is true When we reason analytically, we proceed from the enunciation which is not identical of itself, and all the transformations by which we pass are only hypothetical, but when we have reached the last, it must always be possible to render it identical, whence results the determination of the quantity sought and then, by the mutual connection of the ideas previously expressed, all the intermediate propositions will become identical, and consequently the question proposed is resolved

Those to whom the operations of algebra are familiar will readily perceive, that in thus tracing the process of analytical reasoning, we have only been sketching the progress of that calculus in the resolution of equations, they will see that, since by the last operation we obtain the value of the unknown quantity, the final equation would become identical if we there substituted this value and that it would be the same with regard to all the preceding steps

Analysis, in logic, signifies the method of tracing things backward to their source, and of resolving knowledge into its original principles This is also called the method of resolution, and stands opposed to the synthetic method, or that of composition

Analysis, in rhetoric, is that which examines the connections, tropes, figures, and the like, enquiring into the proposition, division, passions, arguments, and other apparatus of rhetoric

Analysis is also used for a kind of syllabus, or table of the principal heads or articles of a continued discourse, disposed in their natural order and dependency

Analysis is likewise used for a brief, but methodical, illustration of the principles of a science in which sense it is nearly synonymous with what we otherwise call a synopsis

ANALYST, a person who analyses something, or makes use of the analytical method In mathematics, a person skilled in algebra, or in the mathematical analysis in general

ANALYTICAL *a* (from *analysis*) 1 That resolves any thing into first principles (*Boyle*) 2 That proceeds by analysis (*Glanville*)

ANALYTICALLY *ad* (from *analytical*) In such a manner as separates compounds into simples

ANALYTICK *a* (ἀναλυτικός) The manner of resolving compounds into the simple constituent or component parts (*Watts*)

ANALYTICS, the science, or doctrine and use of analysis

To **A'NALYZE** *v a* (ἀναλύω) To resolve a compound into its first principles (*Boyle*)

A'NALYZER *s* (from *To analyze*) That which has the power of analyzing (*Boyle*)

ANAMABOA or **Jamissia**, a town of Africa, on the Gold Coast, where the English have a fort, the country about it is fertile, and produces plenty of corn, but the principal trade is in gold and slaves

ANAMBA, an island in the Indian Sea, west of the island of Borneo Lon 106 44 E Greenwich Lat 2 58 N

ANAMOOKA, or **Rotterdam** one of the new islands, called the Friendly Islands, in the South Pacific Ocean Lon 174 35 W Greenwich Lat 20 15 S

ANAMORPHOSIS, in perspective and painting, a monstrous projection, or a representation of some image, either on a plane or curve surface, deformed or distorted, but which in a certain point of view shall appear regular, and drawn in just proportion

Anamorphoses, or monstrous images, may also be made to appear in their natural shape and just proportions by means of mirrors of

certain shapes, from which those images are reflected again, and then they are said to be reformed

For farther particulars, see Wolfius's Catoptrics and Dioptrics, and some other optical authors See also Hutton's Math and Phil Dictionary

ANANAS, (*ananas*) The egg-shaped pine-apple The plant which affords this fruit, is the bromelia ananas foliis ciliato-spinosis mucronatis spica comosa of Linnéus It is used principally as a delicacy for the table, and is also given with advantage as a refrigerant in fevers See BROMELIA

ANANAS WILD See BROMELIA

ANAPÆST, in ancient poetry, a foot consisting of two short syllables and one long such is the word scŏpŭlōs It is just the reverse of the dactyl

ANAPÆSTIC VERSES, those consisting wholly or chiefly of anapests

ANAPHALANTIASIS, (*anaphalantiasis*, ανφαλαντιασις, from αναφαλαντος, *bald*) In medicine, a thinness of the hair upon the eyebrows

ANAPHORA, in rhetoric, the repetition of the same word or words in the beginning of a sentence or verse Thus Virgil,

Pan etiam Arcadia mecum se judice certet,
Pan etiam Arcadia dicat se judice victum

Many fine specimens of the use of this figure may be found in the Scriptures, and particularly the Psalms Thus, in Ps cxlvi "The Lord looseth the prisoners the Lord openeth the eyes of the blind the Lord raiseth them that are bowed down the Lord preserveth the strangers the Lord loveth the righteous the Lord shall reign for ever And again in Ps. xxix. is a very grand example of the anaphora The voice of the Lord is powerful the voice of the Lord is full of majesty the voice of the Lord breaketh the cedars yea, the Lord breaketh the cedars of Lebanon the voice of the Lord divideth the flames of fire the voice of the Lord shaketh the wilderness the Lord shaketh the wilderness of Kadesh

ANAPHORA, in astrology, the second house, or that part of heaven which is 30° from the horoscope.

ANAPHRODISIA, (*anaphrodisia*, αναφροδισια, from α, priv and αφροδισια, *the feast of Venus*) Impotence A genus of diseases in the class locales, and order dysorexiæ of Cullen It either arises from paralysis, anaphrodisia paralytica, or from gonorrhœa, anaphrodisia gonorrhoica

ANAPLASIS, (from ανα, and πλασσω, *I form*,) among ancient physicians, the replacing of a fractured bone in the same situation it obtained before it was broken

ANAPLEROSIS, among surgeons, expresses the restoring deficiencies, and in this sense is the same with prosthesis.

ANAPLEROTICS, (from αναπληρω, *I fill up*,) in pharmacy, such medicines as promote the growth of flesh in wounds and ulcers

ANAQUITO, in geography, a country of America, in Peru, and in the province of Quito.

A'NARCH *s* An author of confusion (*Milton*)

ANARCHI, Αναρχοι, in antiquity, a name given by the Athenians to four supernumerary days in their year, during which they had no magistrates, the time being employed in creating new ones.

ANA'RCHIAL *a*. (from *anarchy*) Confused, without rule or government (*Cheyne*).

A'NARCHY *s*. (αναρχια.) Want of government, a state without magistracy (*Swift*) The Jewish history presents numerous instances of anarchies in that state, usually denoted by this phrase, that in those days there was no king in Israel, but every man did that which was right in his own eyes, which is a just picture of an anarchy The first anarchy we read of in that commonwealth is that which ensued on the death of Joshua, who leaving no successor, the government devolved to the elders of the tribes, who ruled each according to his own will After the death of these elders, the anarchy became complete

ANARGYRUS, in ancient writers, denotes a person without money, though otherwise sufficiently accommodated with land, and other effects

ANARHICAS Wolf-fish a genus of the class and order pisces, apodalia Head rounded, blunt, fore-teeth in each jaw, conic, large, divergent, six or more, grinders in the lower jaw and palate, rounded, gill membrane, seven-rayed, body, roundish, caudal fin, distinct Three species, all inhabitants of the northern seas (See Nat Hist pl VII) A lupus Ravenous wolf-fish fifteen feet long, a most fierce and ravenous fish, that will fasten on any thing within its reach feeds on smaller shell fishes, which it grinds to pieces with its teeth, and swallows shells and every other part the grinders are often found fossil, and are called load-stones flesh good, but not often eaten A minor Less wolf-fish Inhabits the Greenland seas, with large eyes near the top of the head, resembling those of a dog, large mouth, three sharp, strong, unequal teeth on each side of each jaw, with two smaller in the interior space between A panthernius Panther-wolf-fish Body covered with round brown spots, inhabits the northern and frozen seas; above three feet long, is mucous, inflated, yellowish, and sprinkled over with dots in the place of scales

ANARRHI'NUM In botany, a genus of the class and order didynamia, angiospermia Calyx five-leaved, corol with a nectariferous prominence at its base, pointing downwards the upper-lip flat, without palate, and the orifice pervious capsule two-celled, many-valved It has five species, chiefly found in the southern parts of Europe. A fruticosum, a native of mount Atlas, is a beautiful ever-green shrub, with white flowers, without spur.

ANARTI, or ANARTES, in ancient geography, a people who inhabited the north-west part of Dacia

ANAS. In zoology, a genus of the class and

order aves, anseres Bill convex, obtuse, the edges divided into lamellate teeth, tongue fringed, obtuse, three fore-toes connected, th hind one solitary A hundred and eighteen species (See Nat Hist pl. VIII) Of these some have bills gibbous, and others equal at the base Of the former are, 1 a cygnus Wild-swan, bill semi-cylindric, black, cere yellow, body white Inhabits Europe, Asia, and America 2 A olor Tame-swan same bill, cere and body inhabits Europe and Asia, and is tamed almost every where, is mute, robust, long-lived; feeds on grass and fishes, builds in high grass near lakes, and lays every other day, eggs from six to eight, carries its young on its back when much alarmed, its flesh, when young, was formerly much esteemed 3 A nigricollis Black-necked swan Inhabits Falkland islands, size that of a cygnus 4 A atrata Black-swan Black, wings edged with white, bill red Botany Bay 5 A hybrida Hybrid swan Inhabits Chili Size that of a goose 6 A cygnoides Chinese goose Inhabits Europe, Asia, and Africa bill semicylindric, cere gibbous, eye lids tumid above three feet long Three varieties 7 A gambensis Spur-winged goose Africa Size that of a common goose 8 A indica Barred headed goose India Flesh good 9 A coscoroba Chili goose Chili large bill dilated and rounded at the point, body white 10 A melanotos Black-backed goose Coromandel length two feet nine inches 11 A grandis Great goose Siberia Size, a cygnus 12 A hyperborea Snow-goose Europe, and North America length thirty two inches, flies in vast flocks a very stupid bird 13 A picta Painted-goose Statenland length twenty-eight inches 14 A magellanica Magellan-goose Inhabits the straits of Magellan size twenty-four inches 15 A antarctica Antarctic goose size from twenty four to twenty-six inches Two varieties 16 A variegata Variegated-goose, above brown, spotted with white, beneath chesnut, spotted with white and black New Zealand size that of a major 17 A leucoptera Bustard-goose, Falkland islands size from thirty-two to forty inches flesh good 18 A cinerea Loggerhead-goose, Falkland islands size thirty-two inches, flesh rancid 19 A tadora Sheldrake Burrough-duck head greenish black, body variegated with white Europe and Asia, two feet long, feeds on fishes, insects and herbs, lays from fifteen to twenty roundish white eggs, in rabbit s holes, flesh rancid 20 A spectabilis Grey-headed duck 21 A fusca Velvet duck 22 A nigra Black diver, all of Europe and America size from twenty-two to twenty-four inches 23 A regia Royal duck Chili much larger than a boschas 24 A nilotica Nile duck 25 A beringii Bering duck Bering s island, size of a goose 26 A albifrons White-fronted goose. Europe, Asia, and America migrates southerly in winter, size two feet four inches The above are all that are known to have the bill gibbous at the base Those whose bill is equal at the base, are too numerous to be individually recapitulated; the following are the chief 1 A marila Scaup-duck black, shoulders waved-cinereous, belly, and spot on the wings, white Europe, Northern Asia, and America in winter migrates into warmer countries, feeds on shell fishes, size from eighteen to twenty inches 2 A segetum Bean-goose, Cinereous, beneath dirty-white, bill compressed at the base, tail coverts white, legs saffron Hudson s Bay, and the Hebrides, in autumn comes to England in flocks, and is destructive to corn, size from two and a half to three feet 3 A erytropterus Bernacle Cinereous, front white Europe, sometimes America is plentiful on the sea-coasts of England in the winter length twenty-five inches 4 A Bernicla Brent goose, brown, head neck, and breast black, collar white North America, Asia, and Europe, size that of the bernacle migrates southerly in autumn, and flies in wedge-shape flocks, with perpetual cackling feeds on sea-plants, berries, and marine insects, flesh, when tamed, good 5 A mollissima Eider-duck Bill cylindric, cere on the hind part bifid, wrinkled Northern parts of Europe, Asia, and America length twenty-two inches, feeds on testaceous animals, lays five greenish eggs, in a nest strewed with its own down flesh and eggs good the plumage constitutes the much valued luxury, eider down 6 A clypeata Shoveler, of which there are many varieties in Europe, Asia, and America 7 A formosa Baikal teal The lake Baikal, length fifteen inches Two varieties 8 A clangula Golden-eye Varied with black and white, head tumid, violet, at each corner of the mouth a large white spot Europe, Asia, North America length nineteen inches, builds in the hollows of trees, and preys on shell fishes, mice, fishes, and frogs. 9 A ferina Pochard Red-headed wigeon Two varieties, Europe, Asia, and America length nineteen inches good flesh 10 A crecca Common teal Three varieties Europe and Asia, length fourteen inches 11 A boschas Mallard Wild duck tame-duck Six varieties α cinereous, middle tail feathers of the male recurvate, bill straight collar white β varies in its colours by domestication γ, back sooty, much larger δ size of ε body tinged with grey ζ bill hooked Europe, Asia, and America, about stagnant waters length twenty-three inches feeds on frogs, snails, and almost any filthy substance, builds sometimes near waters, sometimes in trees lays from ten to sixteen blueish-white eggs

ANASARCA (*anasarca* from ανα, *through*, and σαρξ, *flesh*, or *in the flesh*) A species of dropsy from a serous humour, spread between the skin and flesh, or rather a general accumulation of lymph in the cellular system. Dr Cullen ranks this genus of diseases in the class cachexia, and the order intumescentia He enumerates the following species, viz 1. Anasarca serosa, as when the due discharge of serum is suppressed, &c 2 Anasarca oppilata, as when the blood vessels are considerably pressed, which happens to many pregnant women,

&c. 3 Anasarca exanthematica, which occurs after ulcers, various eruptive disorders, and particularly after the erysipelas 4 Anasarca anaimia, when the blood is rendered extremely poor from considerable losses of it 5 Anasarca debilium, when feebleness is induced by long illness, &c

ANASA'RCOUS *a.* (from *anasarca.*) Relating to an anasarca

ANASPASIS (from ανα, and σπαω, *to draw together.*) General spasm, or convulsion-fits It is often however restricted to spasmodic contractions of the stomach

ANASTALTICA (*anastaltica, sc medicamenta*, ανασταλτικα, from αναστελλω, *to contract*) Styptics Adstringents

ANASTATICA, in botany, rose of Jericho a genus of the class and order tetradynamia siliculosa Silicle retuse, crowned at the edge with valves twice as long as the partition, and a mucronate oblique style in the middle; the cells two-seeded. The only known species is a native of Palestine It is often found in our gardens

Anastatica, in helminthology, a species of vorticella, in the fifth order of Vermes, or infusoria. It is compound, with bell-shaped flowers, foot-stalks scaly and rigid. This is the second species of clustering polypes described by Trembley

ANASTOMATICS, or Anastomotics, (from αναστομοω, *I can stop*,) in pharmacy, medicines supposed to have the power of opening the mouths of vessels, and promoting the circulation of the blood

ANASTOMOSIS. (*anastomosis*, αναστομωσις, from ανα, *through*, and στομα, *a mouth*) The communication or inosculation of vessels with one another

Anastomosis, in botany, a species of the Phallus, which see

ANASTROPHE, in rhetoric and grammar, denotes the inversion of the natural order of the words, such as saxa per et scopulos, for per saxa et scopulos

ANASTROUS SIGNS, in astronomy, the twelve portions of the ecliptic, anciently occupied by the respective signs, but which they have now deserted by the precession of the equinoxes

ANATHEMA, among ecclesiastical writers, imports whatever is set apart, separated, or divided, but is most usually meant to express the cutting off a person from the privileges of society and communion with the faithful The anathema differs from excommunication in the circumstance of being attended with curses and execrations. There are two kinds of anathemas, the one judiciary, and the other abjuratory The former can only be denounced by a council, a pope, or a bishop; the latter makes a part of the ceremony of abjuration, the convert being obliged to anathematize the heresy he abjures

In ancient censures we meet with an extraordinary formula, called maranatha, and authors are divided concerning its import and use.

[Chr]ysostom says it is an Hebrew word, signifying the Lord is come, and he particularly applies it to the confusion of those who still abuse the privilege of the Gospel, notwithstanding that the Lord was come among them.

St Jerom says it was more a Syriac than an Hebrew word, though it had something in it of both languages, signifying our Lord is come But he applies it against the perverseness of the Jews and others who denied the coming of Christ, making this the sense of the apostle, if any man love not the Lord Jesus Christ, let him be anathema, the Lord is come

According to this sense, maranatha could not be any part of the form of excommunication, but only a reason for pronouncing the anathema against those who expressed their hatred against Christ, by denying his coming, either in words, as the Jews did who blasphemed him, and called Jesus anathema or accursed, or else by wicked works, as those who lived profanely under the name of Christians Others of the ancients interpret the word of the future coming of Christ, particularly St Austin, who says maranatha is a Syriac word signifying the Lord will come And he particularly applies it against the Arians, who could not be said, as he uncharitably thought, to love the Lord, because they denied his divine nature Dr Hammond and others will have anathema maranatha to have answered to the third and highest degree of excommunication among the Jews, called shammatha

Anathema, in heathen antiquity, an offering or present made to some deity, on account of good fortune, &c and hung up in the temple

ANATHEMATICAL *a* (from *anathema*) That has the properties of an anathema

ANATHEMATICALLY *ad* (from *anathematical*) In an anathematical manner

To ANATHEMATIZE *v a* (from *anathema*) To pronounce accursed by ecclesiastical authority, to excommunicate (*Hammond*)

ANATHOLOSIS (from ανα and θολος, *to disturb*) In medicine, a confusion in the symptoms or appearance of disorders

ANATHOTH, a city of Palestine, north-east of Jerusalem, and not far from it It was one of the cities of Refuge, and was the birth-place of the prophet Jeremiah

ANATHRON See Anatron

ANATIC PROPORTION (from ανα, or Ana, which see) An equality of measure or proportion in the ingredients of a composition

ANATICULA, (*little duck*,) a term used by Roman authors, to denote affection

ANATIFEROUS *a* (from *anas* and *fero*, Lat.) Producing ducks (*Brown*)

ANATOCISM *s* (*anatocismus*, Lat or ανα, *application*, and τοκος, *usury*) The accumulation of interest upon interest. This is the worst kind of usury.

ANATOMICAL *a.* (from *anatomy.*) 1. Relating, or belonging to anatomy. 2. Proceeding upon principles taught in anatomy (*Swift*)

ANATOMICALLY *ad* (from *anatomical*) In an anatomical manner (*Brown*)

ANATOMIST, *s* (ἀνατομικὸς) He that studies the structure of animal bodies, by means of dissection (*Prior*)

To **ANATOMIZE**, *v a* (ἀνατέμνω) 1. To dissect an animal (*Hooker*). 2 To lay any thing open distinctly, and by minute parts (*Shakspeare*)

ANATOMY (*anatomia*, ἀνατομία, or ἀνατομὴ, from ἀνα and τέμνω, *to dissect*), the art or science which teaches the situation, figure, connexions, fabric, actions and uses of the several parts of an animal body

In this definition of the term, anatomy should apply to animals in general but having been appropriated to the frame of man exclusively, it has been necessary to invent another term to express the organs and their respective uses of other animals, as they appear upon actual dissection, and the term Zootomy, or Comparative Anatomy, has been fixed upon for this purpose See COMPARATIVE ANATOMY

We shall here give a general outline of the science, and consistently with the plan we mean uniformly to pursue, shall enter into a more distinct description of the particular parts or organs referred to, under their separate denominations

Origin of Anatomy

Anatomy, like all other histories, has its fabulous epochs Passing these by, however, and forbearing all enquiry into the lives or practice of Esculapius, and his sons Machaon and Podalirius, both of whom are said by Homer to have accompanied the Grecian army in its attack upon Troy, we shall commence our sketch with Hippocrates, of whom we have received an account very different from that of fable, and who is said to have been a descendant of the Podalirius we have just named

Hippocrates flourished about four centuries before the Christian æra, and from his writings is to be collected all the actual information of his day upon the subject of anatomy This great physician, says Dr Hooper, in his well-selected historical compendium, whose principal attention was directed to the symptoms and cure of diseases, was, nevertheless, well aware of the importance of anatomical knowledge to perfection in the healing art hence we find, that his works abound with anatomical facts and observations, interspersed with the prevailing doctrines of the day When it is considered, how many obstacles were thrown in the way of this science, from climate, prejudice, and superstition, the perseverance and acquirements of this great man, the ornament of the medical profession, cannot be sufficiently admired. He describes some parts peculiar to the human body which could only be ascertained by actual dissection The body he made to consist of solids, fluids, and spirits of containing and contained parts. The elementary humours he divided into four kinds blood, phlegm, choler or bile, and melancholy or occult bile. This was agreeable to the philosophy of the age in which he lived, as likewise the notions of all bodies being composed of earth, air, fire, and water He never distinguished between nerves, arteries, veins, or tendons, but calls the heart and its pericardium a powerful muscle, he knew the aorta, vena cava, pulmonary arteries and veins, and entertained obscure notions of the uses of the valves; but considered the auricles as a fan. He mentions the distributions of the arteries and veins by trunks and ramifications from the heart; and asserts, that all the arteries originate from the heart The liver was thought to be the root of the veins, the fountain of the blood, and he supposed it to separate bile He thought the arteries carried the spirits, but was entirely ignorant of the circulation of the blood, and of the use of the diaphragm, and his seating the soul in the left ventricle of the heart is a memorable example of human vanity, and of that inherent inclination in man, boldly to account for what is inexplicable The heart and lungs, he imagined, received part of our drink Of the organ of hearing, it is concluded, he knew little, for he only mentions the tympanum As to the brain, which he thought a gland (an idea which has since been erroneously supposed to belong to Malpighi), the nerves and their uses, vision and the senses, he was totally ignorant in regard to the causes of their several actions, yet he makes the brain the seat of wisdom The glands he imperfectly understood His Pythagorean doctrines of conception, generation, and pregnancy, are, in general, absurd and superstitious; as likewise his notions of the Pythagorean numbers, which seem to have been the prevailing philosophical follies of the day On moles, false conceptions, and the nourishment of the fetus, a rational judgment is formed, he comprehended the communication from the mother to the fetus by means of the umbilical cord; though, in another place, he supposes that it absorbs nutriment by the mouth, and from the surrounding fluid in the ovum

After Hippocrates, anatomy continued to be improved, but, as opportunities were extremely limited from the prejudices of mankind, its progress was but slow, and chiefly confined to the two schools of Athens and Alexandria In the former, the names of Socrates, Plato, Xenophon, Aristotle, and Theophrastus, are still preserved, along with many of their works and, although we perceive that their general attention was directed to philosophy, yet natural history and anatomy were far from being overlooked their opportunities, however, of examining bodies were confined, and after their time, the study of natural knowledge at Athens sunk for ever But while it decayed in Greece and Asia, it rose with increased energy, under the protection of the Ptolomies, at Alexandria In this school, which was so long pre eminent, Erasistratus and Herophilus were highly distinguished for anatomical knowledge By the liberal patronage of the Ptolomies, they enjoyed ample opportunities of dissecting human bodies, and the consequent improvements which anatomy received were very great They not only corrected many former errors, but wrote with great judgment upon neurology They observed a variety of structure in nerves supplying different parts, and hence distinguished them into those which were necessary to sense, and those which were subservient to motion.

Between the times of Herophilus and Erasistratus to Galen, a period of five hundred years, Asclepiades, Rufus Ephesius, and the sensible and elegant writer Celsus, flourished. The two latter have given the appellations and situations of all the parts of the human body, *in compendio*, in which many discoveries appear to have been made from the time of Hippocrates Neither the one nor the other dwelt much on the uses of the parts. Rufus writes Greek in the concise Attic style, and Celsus is the most classical writer that ever appeared in the art of medicine

Claudius Galenus, or Galen, was physician to

four emperors, and was, without exception, the most distinguished practitioner of the age in which he lived. He arranged all the prior anatomical science, that Herophilus and Erasistratus had obtained from the actual dissection of human subjects, and incorporated it into his voluminous treatises on all the branches of medicine. The medical principles of this great man, formed on the Peripatetic philosophy of Aristotle, are not to the present purpose, except that they reigned triumphantly in the schools and universities, disdaining and crushing all innovators or improvers, for a period of nearly fifteen hundred years. The celebrated Galen, however, was a man of uncommon erudition, and he brought into one point of view with much labour, learning, and industry, all the medical and philosophical science of his predecessors. The anatomical part was undoubtedly extracted from the great Herophilus and Erasistratus and, consequently, in general contains what those first dissectors of human bodies had observed or written. In the works of this eminent physician, anatomy appears very conspicuous and methodical. He gives the situation and uses of all the parts of the human body, whether animal, vital, or natural. What discoveries he made, cannot be ascertained, but Galen was the first author who seems to have digested, in regular order, the human functions, the brain and its membranes, the senses, the contents of the thorax and abdomen, osteology, a complete myology, and neurology, in which are the origin and insertion of the muscles, their action, &c., and the distribution of the whole nervous system. The lacteal vessels, likewise, were well known, though the extent of their effects, their passing through the thoracic duct and subclavian vein, to the blood, were not comprehended. The exhalant arteries and inhalants were mentioned, both by Hippocrates and Galen, but their principles of action were unknown. The circulation of the blood, the real uses of the liver, glands, heart, diaphragm, pancreas, kidney, ureters, bladder, universal cellular structure, the power of the nervous system over the arteries and veins, the lymphatic absorbent system he was not acquainted with.

From the time of Galen to the fifteenth century, anatomy was rather on the decline, anatomists being considered learned or ignorant in proportion to their knowledge of his works. The destruction of Alexandria introduced learning among the Arabians, but they made little progress in the knowledge of the human body. Abdollaliph, however, towards the close of the twelfth century, exposed many of Galen's errors in osteology, by frequenting burial grounds.

Among the early cultivators of the science of anatomy in the sixteenth century, the great Vesalius flourished, who may with propriety be styled the restorer of anatomy, being the first who dared expose the errors of Galen, in medicine and anatomy, by referring to the human body. This wonderful man, whose perseverance and genius cannot be sufficiently admired, was born at Brussels, in 1514. After having gone through the usual studies of the age, he went to Montpellier, to study medicine. The principal professors in the university of Paris requested him to come there, where he attended their lectures. Vesalius's zeal for medicine, particularly anatomy, induced him to brave every danger to which he was exposed, by clandestinely procuring bodies for dissection. He did not, however, confine his attention to the human subject only, but opened a great number of animals. In the pursuit of his favourite science, his veneration for Galen diminished in proportion as he detected his inaccuracies; till at length he threw off all control of this great standard of ancient medicine and anatomy, and became the advocate for actual dissection of the human body, to which he constantly referred in all his disputations.

The war which commenced at that time in France, obliging Vesalius to leave Paris, he returned to his own country, Louvain. The knowledge he had acquired in anatomy induced him to profess it publicly in that city, but, in order to extend his anatomical researches, in 1535 he followed the army of the emperor Charles the Fifth, against France. His reputation increased. He was chosen professor of anatomy in the university of Padua, by the republic of Venice, and there gave lectures on medicine, particularly anatomy, for seven years.

In 1539, Vesalius published his anatomical plates, which attracted the admiration of the learned. In this, and in his other works, all the errors of Galen are exposed. A multitude of enemies sprung up against this bold innovator of old established authority. All Europe resounded with invectives against him. Eustachius at Rome, Driander at Marpurg, and Sylvius at Paris, became his public enemies, particularly the latter, who employed every species of calumny to lessen him in the esteem of his patrons; instead of Vesalius, he called him Vesanus, or a madman, and accused him of ignorance, arrogance, and impiety. Fallopius was the only one among his opponents who preserved any moderation. Having been a pupil of Vesalius, he never forgot how much he was indebted to his preceptor; and, although he was far more able than Sylvius to criticise, from having powerful objections to bring forward against the work, he proceeded in the most delicate and respectful manner, influenced by the greatest esteem and gratitude for the assistance he had received from his venerable master. Vesalius, on the other hand, acted towards his pupil in the most gentle and honourable manner. As soon as the remarks of Fallopius on his work had reached Spain, Vesalius prepared to answer them, and replied to him as a father would to his son. Fallopius, who has rendered his name dear to posterity by his extensive knowledge in anatomy, possessed sentiments very different from Sylvius; he was not ashamed of acknowledging his obligations to Vesalius, for the greater part of his information on anatomy; he admits that Vesalius has not shewn sufficient respect to Galen, but confesses that his objections are generally correct. Notwithstanding all opposition, the reputation of Vesalius daily increased, and he established anatomy on solid and permanent principles, when the emperor Charles the Fifth, by whom he had been already honoured, nominated him his first physician, and kept him constantly at court. He now gained the confidence of the nobility and frequently gave unequivocal marks of his profound knowledge in the practice of physic. But an unexpected event soon reduced this great man to distress. Upon the death of a Spanish gentleman, whom he had attended during life, Vesalius requested permission of the relatives of the deceased to open the body, he being very desirous of investigating the obscure cause of his death, which request was granted. Some of the spectators, who probably were not Vesalius's friends, declared they saw the heart palpitate upon his opening the thorax: their

declarations soon reached the ears of the nobleman's relations and raised a suspicion that the body was opened alive, in consequence of which Vesalius was prosecuted for homicide and impiety, and brought before the Inquisition; which severe tribunal was about to punish him for the crime, when Philip the Second of Spain, suggested the means of removing him from the decision of his judges, and caused him to make a pilgrimage to the Holy Land, in consequence of which Vesalius resolved to make the tour of Palestine He passed over to Cyprus with James Malateste, a Venetian general, and thence to Jerusalem Soon after the death of the celebrated Fallopius, which happened in the year 1564, the senate of Venice recalled Vesalius to fill the chair, but on his voyage to Padua, he was shipwrecked on the island of Zante, where this great man reduced to the utmost extremity perished with hunger on the 15th of October 1564 at the age of fifty years It is said, that a goldsmith, who landed on that part of the island soon after the accident, caused him to be interred and an epitaph to be engraven on his tomb in the church of the Virgin Mary in that island

Vesalius had scarcely attained his twenty-fifth year when he published his work, *De Structura Corporis Humani*—on the Structure of the Human Body This extraordinary production would appear incredible in so young a man, were it not attested by the best authority "Vesalius, in my opinion" says Mons Portal, "is one of the greatest men that ever existed Let astronomers boast of Copernicus, natural philosophers of Galileo, Torricelli, &c, mathematicians, of Paschal and the geographers, of Christopher Columbus, I shall always rank Vesalius above them all The house of Vesalius was lately the convent of Capuchins, at Brussels These pious men considered it an honour to date their letters *Ex Ædibus Vesalianis*

From the time of Vesalius the value of human dissection was fully appreciated, though opposed by the prejudices of the vulgar

The beginning of the seventeenth century is remarkable for the discovery of the most important function of animated bodies by our countryman Harvey This great physician was born of a respectable family at Folkstone, in Kent on the 2d of April, 1578 At ten years of age he was sent to a grammar-school at Canterbury, and at fourteen removed to Caius college, Cambridge At nineteen he travelled through France and Germany to Padua, in Italy, where, having studied physic under Eustachius Radius, John Minadous, and Fabricius ab Aquapendente by whom he was taught anatomy, he was created doctor of physic and surgery in that university, in 1602 Returning soon after to England, he was incorporated M D at Cambridge, went to London to practise and married In 1604 he was admitted candidate of the college of physicians in London, and three years afterwards fellow In 1615 he was appointed lecturer of anatomy and surgery in that college.

In the year 1632 he was made physician to Charles the First, as he had been before to king James, and adhering to the royal cause upon the breaking out of the civil wars, attended his majesty at the battle of Edgehill, and then at Oxford, where, in 1642, he was incorporated M D In 1645 the king got him elected warden of Merton college in that university, but upon the surrendering of Oxford the year after to the parliament, he left that office, and retired to London. In the year 1651 he published his work on the generation of animals a book replete with interesting observations, and which would have been more so but for some misfortunes, by which his papers perished during the time of the civil wars. On Michaelmas-day 1654, he was chosen president of the college of physicians in his absence, and coming there the day after, acknowledged his great obligations to the electors for advancing him to such honour and dignity, as if he had been chosen to be "Medicorum omnium apud Anglos princeps" but his age and weakness were so great, that he could not discharge the duty incumbent upon that great and distinguished office, he therefore requested them to elect Dr Prujean, who had deserved so well of the college. As Dr Harvey had no children, he made the college his heirs, and settled his paternal estate upon them in the July following He had three years before built them a combination room a library, and a museum, and in 1656 he brought the deeds of his estate, and presented them to the college He was then present at the first festival instituted by himself to be continued annually, together with a commemoration speech in Latin, to be spoken on the eighteenth of October, in honour of the benefactors to the college, having appointed a handsome stipend to the orator, and also to the keeper of the library and museum, which are still called by his name He died June 3, 1657; and was carried to be buried at Hemstead, in Hertfordshire, where a monument is erected to his memory

In the year 1616 Dr Harvey read a course of lectures, in which he first opened his discovery relating to the circulation of the blood, which some judicious anatomists had before only suspected to exist in a vague and confused manner, and which others had only known to take place in some particular part From this period Harvey demonstrated and taught in his public lectures, and by simple and clear experiments proved to the most incredulous minds, that the blood not only traversed the structure of the lungs, but that it circulated in every part of the body by means of an admirable arrangement on which depends the life of man He fully evinced the alternate contraction and dilatation of the heart; the passage of the blood from the two venæ cavæ into the right auricle from thence into the right ventricle and through the lungs, its reception into the left auricle from the pulmonary veins, its expulsion from thence into the left ventricle, from which it was propelled through all the arteries of the body, and returned by the veins So clearly were the phænomena of the whole circulation understood, and so admirably explained, by Dr. Harvey, that notwithstanding he wrote near two hundred years ago, this function has never since been laid down with more truth, simplicity, and elegance

It does not appear that Harvey was assisted in his discovery so much by the inspection of the human body as that of animals, as frogs, mice, and the like, and the circumstances which result from the application of ligatures to the limbs of living bodies, the opening of arteries and veins, and the labours of those who preceded him. "New proofs of the passage of the blood from arteries into veins, and not from veins into arteries," says this great man, "may be taken from the valves of veins If we inject air," says he, "into these canals, it will not pass from the heart towards the extremities, whilst it is conveyed without any impediment through the veins of the extremities to

wards the heart." The valves, by their position and structure, form so many obstacles to the passage of blood from the heart into the veins, and, on the contrary, facilitate its course in the vessels." To prove that these valves in a living man oppose to the blood passing towards the extremities, a resistance equal to that which they had made to the air injected into the dead subject, Harvey recommends us to observe what takes place in the veins of a man's arm of a spare habit "If a ligature be made above the condyles of the humerus, the vessels are irregularly swelled when its pressure on the arm is inconsiderable, their diameter seems to be larger in some points than in others:" their narrowness, he was of opinion, was occasioned by the valves. "If," continues he, "we carry the fingers from the ligature downwards towards the hands a resistance to the flowing of the blood is perceived, which cannot be surmounted, but, on the contrary, the blood is pushed forwards by a light pressure when directed from below upwards." The structure of the heart itself likewise afforded additional proofs of the new doctrine Of what utility would the valves be that are situated about its orifices? Why should some open from without inwards, and others from within outwards? Because, says Harvey, the former facilitate the entrance of the blood into the heart, and prevent its exit; and the latter permit the passage of the blood out of the heart, and prevent its return In this way the immortal Harvey elucidates all his propositions by decisive proofs, drawing interesting conclusions from each of them

It is objected to Harvey, however, and we are afraid upon good grounds, that he was too avaricious of distinction on account of his discovery, and that he passed over in silence the names of various contemporary and antecedent physiologists, whose observations and experiments were in perfect coincidence with his own, and led directly towards that full disclosure the merit of which is certainly due to himself Servetus, Columbus, Vasseus, and Cæsalpinus, were unquestionably worthy of being quoted, yet he has taken no notice of their labours, notwithstanding that each of them had seen the four principal objects of the circulation Servetus the victim of Calvin, had described the passage of the blood from the right ventricle of the heart into the lungs, had considered the septum of this ventricle as impermeable to the blood; and had traced the entrance of inspired air into the air-cells of the lungs, its transit thence into the pulmonary veins, and its passage to the heart, intermixed with the blood that flowed through them. Columbus had clearly ascertained the pulmonary circulation, Vasseus had described the structure and use of the valves of the heart, and Cæsalpinus, better informed than either of them, had made use of their discoveries in proof of the existence of a corporeal circulation, and the termination of arteries in veins a fact which was farther established by the experiments of Vesalius and Vidus Vidius.

Soon after the discovery of the circulation of ... Asellius, an Italian, discovered the lacteals; Pecquet, in 1647, traced to the thoracic duct ... subclavian vein ... and Bartholin, discovered the ... it does not appear ... was any ... between ... therefore, ... to equal praise ... had, however, ... credit from his having entertained ... ideas of the physiology of the lymphatic system, which was afterwards more fully explained by Glisson.

The two last centuries have nearly perfected our knowledge of the human body. Every nation in Europe has produced anatomists of the greatest reputation: the names of Albinus, Cooper, Diemerbroeck, Highmore, Cheselden, Lewenhoeck, Malpighi, Mayow, Ruysch, Willis, and Winslow, form but a small number of those who have enlightened the science of anatomy in the seventeenth century. In the eighteenth, the following are particularly distinguished: Haller, Morgagni, Zinn, Walter, Scarpa, Soemmering, the Monros, the Hunters, and Cruickshank

Fortunately for mankind, anatomy is now become an indispensable branch of medical science; and throughout Europe we have every where distinguished teachers, who are daily adding to the stock of useful information.

Technology

Yet the science is strangely deficient in its nomenclature; and it is truly extraordinary, that while every encouragement has been given to a reformation of the technical language of botany and chemistry, while the first has, in consequence, obtained no small degree of perfection, and the second has been very considerably ameliorated and simplified; while mineralogy is every day dropping a part of its jargon, and assuming a more definite and classical vocabulary, every attempt towards reforming and purifying the technology of every branch of the medical art, instead of being encouraged, has been rather repelled and resisted, and with respect to the department of anatomy, we are at this moment in the use of the same crude nomenclature in regard to its more important principles, which was put forth in its earliest infancy Every viscus, and almost every vessel, has been accurately traced, and the use of almost every organ accurately determined, or plausibly conjectured, but the *language* of the science is barbarous, inadequate, and indecisive, founded upon no common system, and multifariously generated from an heterogeneous association of Hebrew, Greek, Latin, Arabic, and modern European terms, sometimes single, and sometimes illegitimately intermarried by a mixture in the same word of two distinct tongues or dialects

Scope of Anatomy.

The human body is composed of solids and fluids physiology, as a general science, contemplates both anatomy, as a branch only of physiology, is confined to the former, the latter, antecedently to dissection, being too considerably dissipated, or transformed in their nature, to render them objects of palpable contemplation

The solids of the human body are rather hard or soft, and may be briefly divided into

1 Osteology, or the doctrine of the bones
2. Myology, of the muscles.
3. Angiology, of the vessels.
4 Neurology, of the nerves or sentient system.
5 Splanchnology of the viscera, or general mass of the remaining soft parts of the body with their respective appurtenances and involucres

To these divisions many writers add, as distinct branches, Osteogony, Chondrology, Syndesmology, Bursalogy, Adenology, and Hygrology. Of these we may observe in few words, that the first and last are not, properly speaking, subjects of anatomical attention. Osteogony, or the doctrine

of the formation and growth of bones, and Hygrology, or the doctrine of the fluids, can have little or no reference to the *art of dissection* the former cannot be developed by the knife, and the latter must evade its power Chondrology and Syndesmology, the doctrine of cartilages and ligaments, are naturally branches of Myology, or Osteology; these two substances being more appurtenances to bone or muscle, partaking of a middle nature and serving the purpose of uniting the one to the other, or of rendering bone moveable upon bone, they are for the most part bony membranes without a calcareous deposit. Bursalogy and Adenology, the doctrine of mucous pouches and glands, are, in like manner, distinct parts of Splanchnology or of that part of Angiology which constitutes the secernent system they are either secreting organs, or reservoirs of a secreted fluid, or subserve both purposes at the same time

Our syllabus is, therefore, in its arrangement new and simplified, but we trust not improperly so, and with this short notice of an excision of what appears to us an unnecessary and superfluous divarication we now proceed to the outlines of which it consists

OSTEOLOGY, OR DOCTRINE OF THE BONES

Bones are hard, compact, inflexible, and insensible substances, composed of earth and gluten, which support and form the stature of the body, defend its viscera, and give adhesion to its muscles

The substance of bones is of three kinds — compact, as in the bodies of the long bones, spongy, as in the extremities of the long bones, and reticular, called also the cancelli of bones, as in the cavities of bones which have marrow

The figure of bones is various, yet they are mostly divided, from their shape, into broad and flat, long and round, and cylindrical bones Long and irregular shaped bones are divided into a body and extremities, and flat bones into body and margins

Bones are variously named, some from their situation, as the frontal, parietal, occipital nasal, malar, &c, others from their figure, as the ethmoid bone, clavicle, os cuboides, naviculare, tibia, &c; and some from their use as the sphenoid bone, the maxillary bone the femur, &c The processes and cavities of bone are named after their figure, as the acetabulum of the os innominatum, the odontoid process of the second cervical vertebra, the coracoid process of the scapula, &c, or from their use, as the trochanters of the thigh-bone, or from their situation, as the nasal, palatine, orbitar processes.

If a process be large, and of a spherical shape, it is termed sometimes the caput or head, if the head be flattened, it takes the name of a condyle Other processes are termed mastoid, or mammillary, from their resemblance to a nipple, styloid and coracoid, from their similitude to a stiletto or the beak of a crow, some spinous, which appear like thorns others derive their names from their direction, as the longitudinal, perpendicular, horizontal, oblique, transverse processes

There is a kind of eminence peculiar to bones, called an epiphysis, which should be distinguished from an apophysis, the latter being nothing more than a process, while an epiphysis is a part of a bone connected to the same bone by an intervening cartilage, thus the condyles of the thigh-bone of a child are epiphyses, and are separable from the femur. These epiphyses become apophyses in the adult

Bones support and give stature to the body, defend its viscera, and give adhesion to its muscles

When the bones are deprived of their soft parts, and hung together in their natural situation by means of wire the whole is termed an artificial skeleton when they are kept together by means of their ligaments, they constitute a natural skeleton

Table of the Bones.

				No.
Bones of the Head.	The bones of the cranium, or skull		Os frontis	1
			Ossa parietalia	2
			Os occipitis	1
			Ossa temporalia	2
			Os ethmoides	1
			— sphenoides	1
	The bones of the face		Ossa maxillaria superiora	2
			— jugalia	2
			— nasalia	2
			— lachrymalia	2
			— palatina	2
			— spongiosa inferiora	2
			Os vomer	1
			— maxillare inferior	1
	Dentes, or teeth		Incisores	8
			Cuspidati	4
			Bicuspides	8
			Molares	8
			Sapientiæ	4
	Bone of the tongue, or		Os hyoides	1
	Bones of the internal ear, situated within the temporal bone		Mallei	2
			Inci	2
			Ossa orbicularia	2
			Stapides	2
Bones of the Trunk	The spine	Vertebræ	Cervical	7
			Dorsal	12
			Lumbar	5
		Sacrum		1
		Os coccygis		1
	The thorax	Sternum		1
		Costæ		24
	The pelvis	Ossa innominata		2
Bones of the Upper Extremities.	The shoulder		Claviculæ	2
			Scapulæ	2
	The arm		Ossa humeri	2
	The fore arm		Ulnæ	2
			Radii	2
	The hand	Carpus, or wrist	Ossa navicularia	2
			— lunaria	2
			— cuneiformia	2
			— orbicularia	2
			— trapezia	2
			— trapezoides	2
			— magna	2
			— unciformia	2
		Metacarpus		10
		Phalanges		28
Bones of the Lower Extremities.	The thigh		Ossa femoris	2
	The leg		Patellæ	2
			Tibiæ	2
			Fibulæ	2
	The foot	Tarsus	Ossa calcis	2
			— astragali	2
			— cuboides	2
			— navicularia	2
			— cuneiformia	6
		Metatarsus		10
		Phalanges		28
				240

Sesamoid bones of the thumb and great toe, occasionally found — — 8

Total 248

The skeleton is divided into head, trunk, and extremities.

The Head.

There is a great variety in the shape of the heads of individuals The head of females is more delicate, the insertions of the various muscles of the face are not so strongly marked The crania of different nations also vary; in the generality of Europeans the shape is oblong in the Turk and Algerine it is round; and in the Chinese and Tartar broad The cranium of the African is flattened on the forehead, and the teeth and chin are extended forward The shape of the head of the Asiatic and American negro also varies considerably from the European

The head is divided into the cranium, or skull, and face

The shape of the adult cranium is in general spherical, but there is great variety in skulls The superior part is arched; in some this arch is greater than in others anteriorly it is more or less flattened, posteriorly more or less rounded, but always considerably more convex than on the anterior part: at the sides the cranium is flattened. There are a great number of processes and depressions on the under surface, so as to render it very irregular in its appearance.

The adult cranium is composed of eight bones, viz. one os frontis, which forms the forehead, two ossa parietalia, situated at the upper part and sides of the head; two ossa temporum, placed below the parietal bones, one occipital, forming the back part of the head, one sphaenoidal, placed in the middle of the basis of the cranium, and one ethmoid bone, situated behind the root of the nose. For a more particular description of which see these respective bones under their alphabetic arrangement; as *parietal bones*, *temporal*, *ethmoid*, *sphaenoid*, &c.

Upon viewing the superior part of a skull externally, several zigzag lines are observable, called sutures that which extends from one temple across over the head to the other temple is termed the coronal suture; it unites the frontal bone to the two parietal that which proceeds from behind one ear upwards across to the other, is the occipital or lambdoidal suture, it unites the occipital bone to the two parietal and the suture which extends upon the crown of the head from the lambdoidal to the coronal uniting the two parietal bones is called the sagittal These are sometimes termed the true sutures, to distinguish them from two spurious or squamous, which are found, one on each side of the cranium, extending from the temple backwards, in the form of an arch, and uniting part of the temporal bone to the parietal Besides these two sutures two other portions are to be noticed, the one belonging to the lambdoidal, the other to the squamous suture, being, in fact, continuations of them the one is called additamentum suturae squamosae, the other additamentum suturae lambdoidalis. There are, sometimes, one or more triangular-shaped bones observed in the course of some of the sutures, these are called ossicula triquetra, triangularia, or Wormiana

The chief use which arises from this partition of the cranium into so many pieces, seems to be to facilitate the ossification after birth, and to serve, in some measure, to prevent the spreading of fractures from one bone to another

Besides these sutures, there are several prominences upon the upper part of the cranium; two in the frontal bone, one immediately over each eye between it and the suture; one in the middle of each parietal bone; and one in the middle of the occipital these point out the centre of ossification of those bones.

Upon the internal surface of the upper part of the cranium there is a number of grooves, in an arborescent form; these are made by the spinous artery of the dura mater The sutures are here seen in the form of a line, not dove-tailed, and the whole surface appears more polished than the external

The bones forming the upper part of the skull, or, as it is sometimes called, the calvaria, are composed of an external and an internal table, which are of a compact structure, and of a spongy intervening substance, called the meditullium, or diploe

The internal surface of the basis of the cranium is divided naturally into eight considerable depressions, adapted to the lobes of the brain and cerebellum. The two anterior are immediately over the orbits, and are separated from each other by an obvious eminence, above the root of the nose, called crista galli Immediately before this eminence is a small hole, called the foramen caecum; and on each side of it are a number of perforations, which transmit the olfactory nerves into the nose, they are called the foramina cribrosa. Passing backwards, there are two round holes, near each other, one going to the bottom of each orbit, these are for the passage of the optic nerves, and are called foramina optica beyond these holes there is a small cavity, which will admit the end of one's little finger, surrounded by four processes, two of which are anterior, and two posterior, these are termed clinoid processes, and the cavity in their middle, which contains the pituitary gland, the sella turcica Under each anterior clinoid process is a considerable fissure the foramen lacerum orbitale superius, which communicates with the orbit, and transmits the third, fourth, the first branch of the fifth and the sixth pair of nerves, and the ophthalmic artery Beyond this fissure proceeding backwards there is a round and then an oval hole, the first is the foramen rotundum, through which the second branch of the fifth pair of nerves passes, the other, the foramen ovale, is for the passage of the third branch of the fifth pair of nerves Contiguous to the foramen ovale is a small hole, the foramen spinosum through which the spinous artery of the dura mater enters Between the foramen ovale and the posterior clinoid process on each side of the sella turcica, there is a considerable ragged aperture, the carotid canal, which is partly filled up with cartilage in the fresh subject, and is for the entrance of the carotid artery and the exit of the great intercostal nerve. A projecting portion of bone next presents itself, called the petrous portion of the temporal bone; it has upon its posterior surface an oval opening, the meatus auditorius internus, through which the nerve for the organ of hearing, and the facial nerve, proceed Immediately below this is an irregular oval opening, formed by the junction of the occipital with the temporal bone, this is the foramen lacerum in basi cranii: through the anterior part of this opening passes the eighth pair of nerves, and the posterior part transmits the blood from the lateral sinus of the dura mater, whose course is marked by a deep groove leading to the foramen lacerum into the jugular vein The portion of bone which proceeds backwards from the poste-

rior clinoid processes, between the petrous portions of the temporal bone, is the cuneiform or basilary process of the occipital bone, it is somewhat hollowed for the reception of the medulla oblongata, which lies upon it At the bottom of this process of bone is a considerable opening, called the foramen magnum occipitale; it transmits the spinal marrow, the vertebral arteries, and the accessory nerves of Willis, and a process of the second vertebra of the neck lies in its anterior part Between this opening and the foramen lacerum in basi cranii is the foramen condyloideum anterius, which gives passage to the ninth or lingual pair of nerves Beyond the great occipital foramen is a crucial eminence, to which processes of the dura mater are attached, the horizontal eminence separates the two superior occipital cavities from the two inferior

The bones of the skull of a fetus at birth are far more numerous than those of an adult, for many of the processes of the latter are epiphyses in the former; thus the occipital bone consists of four portions, the sphænoidal of three, &c There are no sutures in the cranium of the fetus The parietal bones and the frontal bones do not coalesce until the third year, so that before that period there is an obvious interstice, commonly called mould, and scientifically, the fontanel, or fons pulsatilis. There is also a smaller space, occasionally, between the occipital and parietal bones, termed the posterior fontanel These spaces between the bones are filled up by the dura mater and the external integuments, so that, during birth, the size of the head may be lessened; for at that time the bones of the head, upon the superior part, are not only pressed nearer to each other, but they frequently lap one over another, to diminish the size during the passage of the head through the pelvis

Os Frontis, or Frontale, situated in the anterior part of the skull, forming the forehead and upper part of the orbits, of a semicircular shape, and when detached from the other bones of the cranium has some resemblance to a cockle shell. Externally, where it forms the forehead, it is very smooth and convex, but below, where it assists in forming the orbit, it affords several processes and cavities The inner and concave surface of this bone is turned towards the brain, and in the centre of its inferior part is the ethmoid bone, which s placed at the top of the cavity of the nostrils It sometimes consists of two portions, in consequence of the sagittal suture being continued down through its middle to the nose This is more frequent in females than males Its processes are, two frontal eminences, which mark the centres of ossification, two frontal tuberosities, which are situated over the frontal sinuses; two superciliary ridges or arches which give origin to the frontal muscles, and whose extremities are called the angular or orbitar processes, behind each external angular process the surface of the bone is considerably depressed, for the situation of a part of the temporal muscle, an external frontal spine, upon which the ossa nasi rest, an internal frontal spine, to which the dura mater adheres, and two orbitar plates, which separate the orbits from the cavity of the cranium

Its cavities are, the cerebral, which contains the anterior portions of the hemispheres of the brain, a large notch between the orbitar plates for the situation of the cribriform plate of the ethmoid bone, two frontal or pituitary sinuses within the bone, above the root of the nose, they are always separated by a thin bony partition, and open by two small holes into the nostrils, of which they form a part; two orbitar cavities, in which are two depressions for the situation of the lachrymal gland, a notch in each superciliary ridge for the trochlea of the superior oblique muscle; a superciliary foramen, through which passes a small artery from within the cranium, together with a branch of the fifth pair of nerves to be distributed to the muscles and integuments of the forehead; the anterior orbitar foramen, which affords a passage to a branch of the ophthalmic artery, and a small twig of the fifth pair of nerves into the nose, this foramen is sometimes formed by the junction of the ethmoid bone with the frontal, the posterior orbitar foramen, which is smaller than the former, and deeper in the orbit; a depression behind the middle of the superciliary ridge for the situation of the lachrymal gland, the foramen cæcum, situated below the beginning of the internal frontal spine

The frontal bone is connected with the two parietal by means of the coronal suture, with the two ossa nasi, the two superior maxillary bones, and the two lachrymal bones, by means of what is called the transverse suture, with the sphænoid bone by means of harmony, called harmonia sphænoidalis, with the ethmoid bone by harmonia ethmoidalis, and with the os jugale by means of suture

The use of the frontal bone is to constitute the forehead, pituitary sinuses, part of the orbit, and to contain and defend the anterior lobes of the brain

Ossa Parietalia called also Ossa bregmatis Ossa syncipitis Ossa verticalia. Ossa verticis

Situated one on each side of the superior part of the cranium, and considerably convex and somewhat quadrangular Each bone is distinguished into an external and an internal surface, and four angles, viz the frontal, sphænoidal, called also the spinous process, the occipital and mastoid. It has a semicircular ridge, from which the temporal muscle originates, and a foramen parietale, which is near the sagittal suture, and transmits an artery and a vein of the dura mater Upon its internal surface are the grooves of the spinous artery, and when the two bones are united, there is a deep cavity extending along the sagittal suture, for the longitudinal sinus of the dura mater

Each parietal bone is connected with its fellow by means of the sagittal suture, with the frontal bone by the coronal suture, with the occipital by the lambdoidal suture; and with the temporal by the squamous suture

The use of these bones is, to form the superior part of the cranium

Os occipitis called also Os basilare O memoriæ. Os nervosum

Situated in the posterior part of the head, and is somewhat of a quadrate oblong shape. The external surface of the occipital bone is convex and very irregular, serving for the attachment of several muscles, the inferior portion of the bone is stretched forwards like a wedge, and at the base of this projecting portion are two condyles, which serve for the articulation of the head with the first vertebra of the neck Its processes are upon the external surface The occipital tubercle, in the middle of the bone to which the ligamentum nuchæ adheres, a transverse spine, proceeding from each side of the tubercle, to which the trapezius and complexus muscles are attached a lesser transverse spine, below the former, for the inser-

tion of the recti muscles; a prominent ridge running downwards from the occipital tubercle, and forming, with the above-mentioned ridges, a crucial spine; the cuneiform or basilary process, situated before the great foramen upon which the basilary artery and the medulla oblongata lie, two condyloid processes or condyles, which are united to the first vertebra of the neck.—Upon the internal surface. An internal crucial spine: the superior branch gives adhesion to the longitudinal sinus of the dura mater, the two lateral to the lateral sinuses, and the inferior to the septum cerebelli. Its cavities are, the foramen magnum occipitale, through which the spinal marrow proceeds into the spine, and the vertebral arteries and accessory spinal nerves into the cranium; two anterior condyloid foramina, for the passage of the lingual pair of nerves; two posterior condyloid foramina (which are sometimes wanting), for the passage of the occipital vein into the lateral sinus, two notches, which, with two corresponding notches of the temporal bones, form the foramina lacera in basi cranii, for the passage of the blood from the lateral sinuses into the jugular vein, and the exit of the par vagum, a considerable groove leading to the above notches, in which the lateral sinuses are situated. The internal surface has also four considerable *depressions*, formed by the crucial spine: the two superior contain the posterior lobes of the brain, and the two inferior, the two lobes of the cerebellum.

The occipital bone is connected by the cuneiform process to the sphenoid bone, in the adult by synostosis; hence professor Sommering describes them as one bone, os occipito sphenoidale; but in youth by synchondrosis: with the two parietal and two temporal bones by the *lambdoidal* suture, with the first vertebra of the neck by ginglymus; and with the second by syndesmosis.

The use of the occipital bone is to constitute the posterior and inferior part of the cranium, to contain the posterior lobes of the brain, the cerebellum and medulla oblongata, and to serve for the articulation of the head with the spine.

Os sphenoideum, called also Os sphenoidale, Os multiforme, Os cuneiforme, Os alæforme, Os vespertilionis, Os [illegible], Os vespiforme.

Situated in the middle of the basis of the cranium, extending underneath, from one temple across to the other. Figure very irregular, and compared by some to a bat with its wings extended. [illegible] two alæ majores, whose anterior [illegible] portion of the orbit, the [illegible] lying upon it a portion of the [illegible] the brain, and the whole external [illegible] covered by the temporal muscle. [illegible] external surface Two spinous processes [illegible] are two narrow points projecting [illegible] behind each foramen spinosum The sphenoidal spine, or azygous process, upon which the [illegible] of the vomer lies, two pterygoid processes, each of which is distinguished into a root and two [illegible] plates, or wings, one external, which gives origin on its external surface to the pterygoideus externus muscle, and on its internal surface to the pterygoideus internus muscle, and the other internal, [illegible] hook-like process [illegible] wing of each pterygoid process, over which the tendon of the circumflexus or tensor palati [illegible] upon the internal surface Two [illegible] which form the upper part of the superior orbital fissures, four clinoid processes, two anterior and two posterior. Its cavities are, the sphenoidal pituitary sinus, which is in the middle of the bone, has a communication with the nostrils, and is divided by an intermediate septum; two pterygoid depressions, one between each greater and lesser wing, for the reception of a part of the palate bone; two foramina, each leading to a canal, called the pterygoid or Viduan canal, in the root of the pterygoid process, through which the recurrent or Viduan branch of the fifth pair of nerves passes into the cranium.—Internal processes: the sella turcica, or ephippium, which is surrounded by the four clinoid processes, and contains the pituitary gland; two foramina optica, one before each anterior clinoid process, which transmit the optic nerves; two grooves, one on each side of the sella turcica, between the anterior and posterior clinoid processes, formed by the pulsation of the carotid arteries; two foramina lacera orbitalia superiora, between each greater and lesser wing, through which the third, fourth, first branch of the fifth, and the sixth pair of nerves, and the ophthalmic artery, pass out of the cranium; two foramina rotunda, for the passage of the second branch of the fifth pair of nerves; two foramina ovalia, for the third branch of the fifth pair; two foramina spinosa, through which the spinous artery of the dura mater enters the cranium.

The sphenoid bone is connected with all the bones of the cranium, with the frontal, the ethmoid, the two parietal, and the two temporal by harmony, and with the occipital by synostosis it is also united to the two cheek bones, the two superior maxillary bones, and the two palate bones by harmony, and to the vomer by gomphosis.

The use of this bone is to form the basis of the cranium, to concur in forming the orbits, the pituitary sinuses of the nose, the temples, &c and to contain the middle lobes of the brain

The two Ossa Temporalia, or Temporum,

Of an irregular figure, and situated at the sides and inferior part of the cranium, containing within them the organ of hearing Each bone is divided into a squamous portion, which is flat, and forms the squamous suture, and a part of the side of the cranium, and a petrous portion, sometimes termed the os petrosum, which is very irregular, and is situated in the basis of the skull, it is a hard craggy protuberance, nearly of a triangular shape, and surrounds the organ of hearing, and below this petrous portion is a concave angular projecting portion, which forms a part of the lambdoidal suture Its processes are, the zygomatic, which, with a process of the os jugale, forms the zygoma, yoke, or arch of the temples, underneath which the temporal muscle moves, and from whose lower edge several muscles of the face arise, particularly the masseter and zygomatic The mastoid or mammary process, which projects from under the ear, and has inserted into its anterior part the sterno-cleido-mastoideus muscle, and into its posterior part the complexus, the obliquus, and trachelo-mastoideus. The styloid process, which is long and pointed, and gives origin to a ligament of the os hyoides, also to the stylo-hyoideus, stylo pharyngeus, and stylo-glossus muscles. The vaginal process, which surrounds the root of the styloid. The auditory process, or outer bony circle of the auditory passage, to which the membrana tympani and cartilage of the ear are fixed. Its cavities are, the meatus auditorius externus, which leads to the cavity of the organ of hearing, the meatus audito-

rius internus, which begins on the internal and posterior surface of the petrous portion, and transmits the seventh pair of nerves, it has immediately within it the internal opening of the aqueduct of Fallopius; a cavity between the zygomatic, auditory, and vaginal processes, which serves for the articulation of the lower jaw, and is separated in the middle by a fissure, into which the ligament that secures the articulation of the lower jaw with this bone is fixed, a considerable groove behind the mastoid process, from which the digastric muscle arises; the foramen stylomastoideum, so called from its situation between the styloid and mastoid processes, it is also called the aqueduct of Fallopius, and transmits the facial nerve; the fossa jugalis, a thimble-like cavity, situated below and on the fore part of the foramen stylo-mastoideum, the beginning of the internal jugular vein occupies this cavity, the canalis caroticus, which begins before and a little above the jugal fossa; it first runs upwards, and then forwards, forming a kind of elbow, and terminates at the end of the petrous portion. Through this serpentine canal the internal carotid arteries proceed to the brain, and two filaments of the intercostal nerve pass out to form the great intercostal nerve, the Eustachian tube, which runs outwards and backwards in an horizontal direction, until it terminates in the cavity of the ear, called the tympanum, the hiatus Fallopii, a small foramen situated within the skull, about the middle of the anterior surface of the petrous portion, it receives a twig of the portio dura, a furrow, in which a part of the lateral sinus is received.

Each temporal bone is united to the [illegible] the squamous suture, with the occipital [illegible] lambdoidal suture, with the sphenoid and [illegible] bones by harmony, and with the lower jaw [illegible] arthrodia

The squamous portion consists of two tables and a diploe, the mammary process, of cells which communicate with the cavity of the organ of hearing, and the petrous portion is very hard and compact The use of these bones is to contain the middle lobes of the brain, and the organ of hearing, and to concur in forming the temples and the basis of the cranium

Os ethmoideum called also Os ethmoidale Os cribriforme Os cribrosum

A four-side bone, situated in the anterior part of the basis of the skull, behind the root of the nose, and between the orbits. Its processes are, a cerebral or cribriform plate, which lies horizontally above the root of the nose, within the cavity of the cranium it is every where perforated by a number of small foramina, through which the olfactory nerves pass into the cavity of the nostrils. The crista galli, a process somewhat like a cock's comb, which proceeds upwards from the middle of the cribriform plate, and has attached to it the falciform process of the dura mater Two orbitar plates, called also ossa plana, and plana papyracea, which are very smooth externally, and form the inner side of the orbits The septum ethmoidale, nasal plate azygous process, or perpendicular lamina, a considerable process descending directly under the crista galli into the cavity of the nose, and forming with the vomer the septum narium Two cavernous substances, which are curled, like a piece of parchment, one on each side of the septum, called improperly the superior turbinated or spongy bones, and conchæ superiores Its cavities are, a number of cribriform foramnula, situated on each side of the crista galli. Two foramina orbitalia interna, one situated in the line of union between the frontal bone and orbitar plate of the ethmoid, for the passage of the nasal branch of the orbital nerve. A number of cells, which compose the internal part of the bone, and form the pituitary sinuses of the ethmoid bone.

The ethmoid bone is united to the os frontis, the two nasal bones, the two superior maxillary, the two palatine, the sphenoid bone, and the vomer, by harmony It forms an extensive surface for the organ of smell, and constitutes part of the nose, orbits, and cranium

The bones of the face are fourteen in number, and consist of those of the upper and under jaw The upper jaw is formed of thirteen bones, viz two superior maxillary, two nasal, two palatine, two jugal or malar, two inferior spongy, two lachrymal, and the vomer, which are united to the cranium, and with one another, by harmony. The under jaw consists of one bone

There is an obvious line, beginning at the external angle of the orbit, where the frontal bone is united to the cheek bone, which leads to the inferior opening in the orbit, proceeds upwards to the nose, whose root it crosses, and then traverses the other orbit to the external angle: this is called the transverse suture The other harmonies of the face are named after the bones which they unite, as the zygomatic, nasal, palatine harmonies, &c

Ossa Maxillaria Superiora.

Two hollow bones situated in the anterior and middle part of the face, and assist in forming the nose, orbit, and palate, so that their shape is very irregular Their processes are, the nasal, which forms the side of the nose. The orbitar or plate, which forms part of the orbit The malar, by which it is united to the cheek bone The alveolar, in which the teeth are situated The palate, which forms the palate. A spine, formed by the union of each palate portion, upon which the vomer rests. The orbital margin. Its cavities are, the sinus maxillaris, called also antrum Highmori, and sinus maxillaris pituitarius, in the body of the bone, between the orbital and palate processes, [illegible] into the nostrils. The infra-orbital canal, which opens under the margin of the orbit, and transmits the infra-orbital nerve. The lachrymal depression, situated in the superior and internal part of the nasal process, for the situation of the lachrymal sac, which leads to the canalis nasalis, or ductus ad nasum, which conveys the tears into the nostrils. The posterior palatine foramen, near the last tooth, [illegible] for the passage of the alveolar nerve [illegible] anterior part of the palatine process, which with the corresponding notch of the other superior maxillary bone forms the foramen palatinum anterius, or foramen incisivum, which transmits the anterior palatine nerve and artery

Each superior maxillary bone is connected with its fellow, with the os frontis, one os nasi, one lachrymal bone, the ethmoid, sphenoid, one os jugale, one palatine bone, and one inferior spongy bone, by harmony, and with the upper teeth by gomphosis

The use of these bones is to form part of the face, palate, nose, nostrils, and orbits, and to afford a convenient situation for the organ of mastication.

Ossa malarum, called also Ossa jugalia, Ossa zygomatica, or Cheek bones

[illegible] at the sides of the face, and nearly of a

quadrangular shape The processes are, the upper orbitary, which forms part of the orbit and the sharp edge of the temple The inferior orbitary, opposite to the former, and constituting in part the bottom of the orbit and the edge of the cheek. The internal orbitary, which also forms a part of the orbit The maxillary, by which it is joined to the superior maxillary bone. The zygomatic, which is joined to the temporal bone, to form the zygoma

The os jugale is united to the frontal, superior maxillary, sphenoid, and temporal bone, by suture. Its use is to assist in forming the face and orbits.

Ossa nasi, Ossa nasalia, or Bones of the Nose,

Of an oblong and quadrangular shape, formed of a very compact substance, and placed close to each other in the superior and middle part of the nose, in such a way as to form a strong arch, called the bridge of the nose

In each bone may be noticed an external and an internal surface, and four margins There is always a small foramen in each bone for the passage of blood-vessels and nerves Their use is to form the bridge and external part of the nose

Each bone is connected with its fellow, and the superior maxillary bone by harmony, and with the frontal and ethmoid by the transverse suture

Ossa Lachrymalia, or Unguis,

Two flat quadrangular bones, resembling somewhat the nail of the finger, situated one in each orbit at the internal angle, and separating the orbit from the nostrils The surface towards the eye is concave, and has a groove, in which the lachrymal sac is situated The internal surface is convex, and covers some of the ethmoid cells, and part of the nostril

Each bone is connected with the frontal, ethmoid, superior maxillary, and inferior spongy bone by harmony Their use is to assist in covering the labyrinth of the nose, in forming the orbits, and to afford a situation to the lachrymal sac.

Ossa spongiosa inferiora, Turbinata inferiora, or Conchæ inferiores,

Situated in the side and lower part of the nostrils, and are of a spiral and convoluted figure They augment the surface of the organ of smelling

Each bone is united with the superior maxillary, the palate, lachrymal, and ethmoid bone, by harmony.

Ossa palati,

Extremely irregular in their shape situated in the posterior part of the nose, from which they ascend to the orbits The irregularity of their figure gives rise to their division into palatine, pterygoid, nasal, and orbital portions Their processes are, the palatal plate, which forms the posterior part of the roof of the mouth The pterygoid process, which is situated behind the last grinder. The nasal process, which arises perpendicularly from the palate, and covers a part of the antrum of Highmore The orbitary process, which is situated in the orbit They form the posterior part of the palate

Each bone is united to its fellow the superior maxillary bone, the sphenoid, ethmoid, inferior spongy bone, and vomer, by harmony

The vomer is situated perpendicularly between the roof of the mouth and the septum ethmoidale, in the cavity of the nostrils, which it divides into two parts It bears some resemblance to the plough-share used in former times. It sustains and divides the cavity of the nostrils.

Superiorly it is united with the sphenoid bone by gomphosis, and with the ethmoid by harmony; inferiorly with the superior maxillary and palatine bones by harmony, anteriorly it is united to the cartilaginous septum of the nose

Os maxillare inferius.

Mandibula, or lower jaw bone, shaped somewhat like a horse-shoe, and occupies the inferior and anterior part of the face Its processes are, two condyloid or articulatory, received into the articulatory cavities of the temporal bones Two coronoid, which are sharp-pointed, and give adhesion to the temporal muscles The alveolar, in which the teeth are fixed The symphysis of the jaw, in the middle of the chin The inferior margin, whose ends form the angles of the jaw Its cavities are, a semilunar notch, between each coronoid and condyloid process. The alveoli, or cavities in which the teeth are fixed. Two posterior maxillary foramina, one above each angle, on the inner surface of the jaw, which transmit the lower maxillary nerve and artery into a canal in the middle of the bone, called canalis mentalis, which conducts the same artery and nerve to the anterior maxillary foramina, upon the external surface of the bone, one on each side of the chin, from whence the artery and nerve again emerge upon the chin. It retains the roots of the teeth in the alveolar margin, constitutes the inferior segment of the cavity of the mouth, and affords a point of adhesion to the muscles of the face, neck, larynx, and tongue

The lower jaw is united to the temporal bones by ginglymus, with the teeth by gomphosis, and with the os hyoides and other parts by syssarcosis

The ginglymus joint of this bone with the os temporis, is formed by the large articular cavity of the latter receiving the condyloid process of the lower jaw In this joint there is a moveable interarticular cartilage, which is very closely connected to the condyloid process and the articular cavity by ligaments arising from their edges, and the whole is surrounded by a capsular ligament fixed to the temporal bone and the neck of the condyle By the peculiar formation of this joint, the lower jaw has many motions; thus when the condyles slide forwards, the lower jaw passes horizontally forwards as in the action of biting, or the condyles only may be brought forwards while the rest of the jaw passes backwards, as is the case when the mouth is open The condyles may also slide alternately backwards and forwards, and *vice versa*, so that while one condyle advances the other moves backwards, turning the body of the jaw from side to side, as in grinding the teeth The principal use of the interarticular cartilages seems to be that of securing the articulation by adapting themselves to the different inequalities in these several motions of the jaws, and to prevent any injuries from friction

The Cavities formed by the Bones of the Face and Cranium

Are, the orbits, nostrils, mouth, in which are the teeth, the fauces, in the anterior part of which is the os hyoides, and the cavity of hearing, situated in the temporal bone

The orbits are two conoidal cavities, situated under the forehead, and on each side of the root of the nose The angles of the orbits are called canthi

The nostrils are two pyramidal cavities situated under the anterior part of the cranium, in the middle of the face, and covered anteriorly by the nose

The use of these cavities is to form a situation for the organ of smelling, and the pituitary membrane of the nostrils, and to serve also for speech and respiration

The cavity of the mouth is situated between the upper and under jaw, and is covered laterally and anteriorly in the fresh subject by the cheeks and lips: posteriorly it is continued into the fauces The two superior maxillary bones and the palatine portions of the palate bones form the superior part of the mouth, and anteriorly it is closed by the teeth

The teeth are hard bones, partly covered with a peculiar substance, called enamel, and fixed one after another in the upper and under jaw, in such a manner, that in the adult there are sixteen belonging to each

Every tooth is divided into a crown, which is covered by the enamel, a neck, or the part embraced by the gum; and a root, also called the fang, which is hidden within the socket

There are four kinds of teeth: incisores, cuspidati, bicuspides, and molares.

The incisores are eight in number, four in each jaw, they are situated in the front of the mouth and are flat and sharp edged, so as to cut the food, the roots or fangs are simple; those of the upper jaw are fixed obliquely backwards, so that they generally cover a small part of the incisors of the under jaw

The tooth on each side of the incisors is called cuspidatus, or canine, they consequently are four in number The fang of these teeth is single, and goes a considerable way in the jaw, especially the two of the upper jaw, which were supposed to go to the eye, and are therefore called the eye-teeth. The oral part of the cuspidati is rounded, and their end pointed, as their name implies

The bicuspides are eight, two being situated next to each cuspidatus, they appear at both extremities, as if they were formed by the junction of two incisors

The molares are twelve, and situated three at the extremity of each jaw The fangs of these are varied, those of the under jaw have two, and those of the upper three Their oral extremities are full of irregularities, so that they are able to grind the food between them The two last molares are distinguished by the name of dentes sapientiæ, they are always the last that appear, and not unfrequently the first which decay their fangs are squeezed, as it were, into one

The teeth are fixed in the alveoli of the jaws by gomphosis, so that each tooth fills up its appropriate socket, which is separated from the next by an intermediate, thin spongy partition

The cavity of the fauces is situated under the basis of the cranium, within the superior bodies of the vertebræ and posterior part of the nostrils It is composed of ten bones viz the occipital, two palatine, the vomer, the bodies of the three first vertebræ, the os hyoides, and the two temporal bones. See OCCIPITAL, &c

The cavity of hearing is situated within the petrous portion of the temporal bones, and consists of the meatus auditorius externus, the cavity of the tympanum and the labyrinth

In the fetus the squamous and petrous portion are divided by a cartilaginous substance In consequence of the bony fibres being much more delicate than in the adult bone, very beautiful preparations of the bony organ of hearing can be made by cutting away the surrounding parts

The soft parts which are placed in this cavity, and which form the immediate organ of hearing, belong to the division of Splanchnology

The Trunk

Of the skeleton is divided into the spine, chest, loins, and pelvis.

The Spine has various denominations Columna spinalis. Columna vertebralis Theca vertebralis Spina dorsi

It is a long, bony, and cartilaginous hollow column, extending from the occipital bone of the head down to the os sacrum, in the posterior part of the trunk In the neck it projects somewhat forward to support the head, which would otherwise require a greater number of muscles Through the whole length of the thorax it is carried in a curved direction backwards, and thus adds considerably to the cavity of the chest In the loins the spine again projects forwards in a direction with the centre of gravity

The spine is formed of twenty four bones, called vertebræ, which are very intimately connected together

The vertebræ, from their situation with respect to the neck back, and loins, are divided into cervical dorsal, and lumbar, and each of these classes have particular characters

Each vertebra is divided into surfaces, margins, a body, processes, and cavities

The cervical vertebræ are seven in number, their bodies are smaller, and of a firmer texture than the other vertebræ The transverse processes are short and bifurcated, and there is a foramen in their basis peculiar to them for the passage of the vertebral artery and vein The spinous processes are also forked, are shorter than those of the other vertebræ, and are much more inclined downwards The oblique processes are more deserving of that name than either those of the dorsal or lumbar vertebræ.

The two first of the cervical vertebræ differ from the rest the first is called atlas, it has no body, nor spinous processes, but forms an arch, which anteriorly surrounds the dentiform process of the second vertebra Instead of upper oblique processes, there are two articular sinuses. The second vertebra is termed epistrophæus, dentatus, or dentata. An odontoid or dentiform process at the upper part of the body is peculiar to it

The dorsal vertebræ are twelve in number They are distinguished by a depression at the sides of their bodies, and a superficial one in the points of the transverse processes, for the attachment of the great and little heads of the ribs

The bodies of these vertebræ are more flattened at their sides more convex before, and more concave behind than the other bones of the spine their upper and lower surfaces are horizontal The spinous processes are long, flattened at their sides, divided at their upper and back part into surfaces by a middle ridge, which is received by a small groove in the inner part of the spinous process immediately above it, and connected to it by ligament, they are terminated by a kind of round tubercle The transverse processes are of considerable length and thickness, and are turned obliquely backwards.

The lumbar vertebræ are five, they are much larger than the dorsal, and the transverse processes have no depressions.

The vertebræ, at birth, consist of three parts, connected together by cartilage; one of these is the body, and the other two the transverse processes. The anterior part of the first vertebra is entirely cartilage. The second vertebra often

consists of five and six portions The spinous processes are all cartilage

The Thorax, or Chest,

forms the upper part of the trunk It resembles an arched bony cavity, narrow above, broad below, flat anteriorly, hollow posteriorly, and convex laterally The bones which compose the thorax are the twelve dorsal vertebræ already described, the sternum, and twenty-four ribs

The ribs are semicircular bones, situated twelve on each side of the chest, and extending obliquely from the dorsal vertebræ round towards the sternum, to which they are connected by strong cartilages They are distinguished into seven true ribs on each side, or those whose cartilaginous extremities are affixed to the sternum, and five spurious or false on each side, whose extremities do not reach the breast-bone Each rib may be divided into a body, or middle part, two extremities two margins, and two surfaces

The cartilage which unites the anterior extremity of a rib to the sternum is long, broad, and strong, and in each of the true ribs reaches to the sternum, where its articulation is secured by a capsular ligament The cartilages of the sixth and seventh ribs being much longer than the rest, are extended upwards to reach the sternum, they are usually united to one The cartilages of the false ribs are supported in a different manner, they terminate in an acute point before they reach the sternum, the eighth rib being attached by its cartilage to the lower edge of the cartilage of the seventh, or last, of the true ribs, the ninth in the same manner to the eighth, and the tenth to the ninth, the cartilage of each rib being shorter than that of the rib above it The two last are not fixed at their anterior extremities, but hang loosely, supported by ligamentous fibres

The sternum, os pectoris, or breast bone, is an oblong flat bone, shaped somewhat like a dagger, situated in the anterior part of the thorax, between the true ribs It is of a very spongy texture, and mostly consists of two, and sometimes of three portions. A sharply pointed cartilage is attached to the inferior extremity of the sternum, which is named, from its supposed resemblance, the xyphoid or ensiform cartilage. It is situated at the pit of the stomach.

The bones of the loins are the five lumbar vertebræ, which have already been described

The pelvis, so named from its resemblance to a bason formerly used by barbers, forms, as it were, the base of the trunk of the skeleton It consists of four bones, the ossa innominata, the os sacrum, and the os coccygis, which are situated at the bottom of the trunk, and above the lower extremities It is within the cavity formed by these bones that the internal organs of generation are situated the urinary bladder, the rectum, and occasionally a part of the small intestines. The pelvis also serves as a firm support to the upper part of the body, and unites the bones of the trunk with those of the lower extremities.

There is a considerable difference of capacity in the male and female pelvis. The os sacrum is shorter and broader in the latter; the iliac portions of the ossa innominata are more expanded, whence it happens that in women the centre of gravity does not fall so directly on the upper part of the thigh as in men. From these circumstances the brim of the pelvis in women is nearly of an oval shape, being considerably wider from side to side, than from the symphysis pubis to the os sacrum; while in man it is rounder, and every where of less diameter The inferior opening of the female pelvis is also proportionably larger in the female subject, the ischia being more separated from each other, and the foramen magnum ischii larger, so that where the ischiatic and pubic portions of the ossa innominata are united, they form a greater circle the os sacrum is also more hollowed though shorter, and the os coccygis more loosely connected, and therefore capable of a greater degree of motion than in men

The Ossa Innominata called also Ossa ilii, Ossa ischii, Ossa pubis, Ossa coxarum, Ossa coxendicis, Ossa anonyma,

Constitute the side and anterior part of the pelvis, and are extremely irregular in their shape

Each bone is divided into three portions, viz ilium, the uppermost, ischium, the lowest, and pubis, the anterior These are very commonly termed os ilium, os ischium, and os pubis

Each os innominatum is connected with its fellow anteriorly by symphysis, with the sacrum posteriorly by strong cartilages and ligaments, and with the head of the thigh-bone by enarthrosis

The os sacrum, which derives its name either from its being offered in sacrifice by the ancients, or from its supporting the organs of generation, which they considered as sacred called also os latum or clunium, is a bone of a triangular shape bent inwards, and situated at the bottom of the spine, and the posterior part of the pelvis It is by many described as a bone of the spine, and from the irregularities resembling spinous and transverse processes, and its foramina, it seems to have some just claim to be considered as such

Os Coccygis,

So called from its resemblance to a cuckoo's bill, consists very frequently of two three or four portions, which are triangular or irregularly shaped, they are placed at the extremity of the sacrum

The superior Extremities

Hang from the superior part of the sides of the thorax, and are composed of the bones of the shoulder arm, fore arm, and hand

The shoulder consists of two bones, the clavicle and scapula, which are united together immediately over the top of the os brachii, and form what is properly termed the shoulder, summitas humeri

Clavicula Clavis Furcula Furcula Os jugal

Or collar bone is a long roundish bone, shaped like the letter *f* and situated obliquely in the upper and lateral part of the chest

The *scapula* or blade bone, is of a triangular figure, and is situated in the upper and lateral part of the back Its anterior and internal surface is irregularly concave from the impression of muscular and tendinous packets, its posterior and external surface is convex and divided into two unequal parts by a considerable process or spine

The shoulder joint is one of considerable importance, it is loose, moveable, and very free in its motions It is formed by the large round head of the humerus, and the shallow articular cavity of the scapula, the sides of which are elevated with cartilage A capsular ligament, large, wide, and loose, fixed to the neck of the scapula and humerus, surrounds this joint A considerable quantity of synovia is requisite to lubricate it, and accordingly it is supplied by several bursæ mucosæ opening into it, independently of the natural secretion of the capsule; of these we observe one,

under the tendon of the subscapularis, one under the short head of the biceps, one between the coracoid process and the scapula, and a very large one under the acromion process. The motion of the shoulder joint is restrained, and the joint rendered more secure, by the acromion process, which projects over it; by the coracoid process below; by a strong ligament, which extends from the coracoid to the acromion process; by a ligament extending from the acromion to the capsule of the joint; and principally by the action of the four muscles which are inserted into the capsular ligament.

The *brachium* or arm consists of one long bone, the os brachii, or os humeri, which occupies the space between the junction of the clavicle with the scapula and the fore arm. It is a long cylindrical bone, thickest at its ends, and distinguished into body and extremities.

The *humerus* is connected with three bones, with the scapula by arthrodia, and the cubit and radius by ginglymus.

The fore arm is composed of two bones, the ulna and radius: the first forms the internal and posterior part, and the second the external and anterior part. The ulna is connected superiorly with the trochlea of the humerus, and inferiorly with the carpus, both by arthrodia, and with the radius by trochoides.

The radius is connected to the humerus by ginglymus, to the cubit by an interosseous ligament and trochoides, and to the carpus by arthrodia.

The bones of the hand consist of those of the carpus, metacarpus, and fingers.

The *carpus*, or wrist, is situated between the fore arm and metacarpus. It is composed of eight bones, which lie close to one another in a double row, one of which is superior, the other inferior. In the superior row are (from the thumb to the little finger) os scaphoides or naviculare, os lunare, os cuneiforme, and os orbiculare, or subrotundum. In the lower row are, os trapezium, os trapezoides, os magnum and os unciforme.

All of these bones bear some resemblance to the names given to them; they are extremely difficult, nevertheless, to be known when separated.

The bones of the carpus are united to those of the fore-arm and metacarpus by arthrodia. A capsular ligament surrounds them, and the joint is strengthened by several others, which proceed in all directions.

The metacarpus is placed between the carpus and fingers. It consists of five long rounded bones, one of the thumb, and four metacarpal bones of the fingers.

The fingers, digitus manus, are situated at the inferior extremity of the metacarpus, and consist of a thumb and four fingers. The thumb has two bones, and each finger three, which are called phalanges, from their being placed in rows. Each bone is broadest at its upper extremity, and formed into a superficial cavity whose edges are rough for the insertion of ligament: the body, or middle part, is convex externally, and concave before: the lower extremity is rounded, and like a trochlea, or a pulley.

The inferior Extremities

Consist of the bones of the thigh, leg, and foot.

The thigh has but one bone, which is by far the largest in the body, the os femoris or femur.

It is so called, because it bears the body, and is a long cylindrical bone, thickest at its extremities, and situated between the pelvis and leg.

The head, which is received into the acetabulum of the os innominatum, has a small dimple in its middle, for the attachment of the round or restraining ligament. The neck, upon which the head stands, is rough, and gives attachment to the capsular ligament. The great trochanter, is a large unequal eminence below the neck, for the insertion of the glutæi muscles. The little trochanter receives the psoas and iliacus internus. The body of this bone is smooth and convex before, and hollow behind, where there is a rough line called linea aspera.

The femur is connected to the acetabulum of the os innominatum by enarthrosis, and to the tibia and patella by ginglymus.

The leg is that part of the lower extremity between the femur and foot. It consists of three bones, the tibia, fibula, and patella.

The tibia is a long, thick, triangular, and cylindrical bone, much the thickest at its upper extremity, placed between the femur and tarsus in the anterior and inside of the leg.

The anterior ridge or angle of the tibia is called the spine or shin, and the external gives attachment to the interosseous ligament. At the lower head of the tibia there is a considerable process which forms the inner ankle.

The tibia is connected to the femur and patella by ginglymus, to the fibula by syneurosis, and to the astragalus by arthrodia.

The fibula is a longitudinal bone situated in the outer part of the leg, by the side of the tibia. At its lower extremity it has a considerable process which forms the outer ankle.

It is connected to the tibia by an interosseous ligament, and to the astragalus by arthrodia.

The patella, rotula, or knee pan, is a small triangular, or heart shaped spongy bone, situated between the inferior extremity of the thigh-bone, and the upper part of the tibia.

It is connected to the condyles of the femur by ginglymus, and with the tibia by syneurosis.

The bones of the foot, like those of the hand, are distinguished into three orders, those of the tarsus, metatarsus, and toes.

The tarsus, like the carpus, consists of a number of small bones. They are seven in number, and are placed between the leg and metatarsus. They are denominated astragalus, os calcis, os naviculare, or scaphoides, os cuboides, and three ossa cuneiformia. Viewed all together, the superior part of the tarsus appears convex and headed, its hinder part forming the heel, its anterior part the back of the foot. Below it is concave, and affords a secure passage for the blood-vessels and nerves.

The connexion of the bones of the tarsus is with the tibia and fibula by arthrodia, and with the metatarsal bones, and also with one another, by amphiarthrosis.

The metatarsus is situated between the tarsus and toes, and is composed of five longitudinal bones, which form the back and sole of the foot. These agree in their general character with those of the metacarpus, but are longer and thicker: the basis or posterior extremity of each is thicker than the other extremity, which is rounded. Their bodies are somewhat triangular.

The great toe is composed of two, and the other toes of three small bones, called phalanges.

There are a number of bones called sesamoid, sometimes found among the bones of the toes, of the size of a small pea, situated generally about the joints of the thumb and great toe.

The natural colour of recent bones is various, in the fetus they are red, bluish in youth, and white in old age

Bones have always their arteries arising from contiguous trunks and their veins return the blood in o those in the neighbourhood In the larger and cylindrical bones there is a canal for these vessels The nerves pass in along with the arteries, from contiguous branches The absorbents come out with the veins

Bones are connected with one another, so as to admit of motion, which kind of union is termed diarthrosis, or so as to admit of no motion, which is termed synarthrosis, and when connected with one another by an intervening substance, the union is termed symphysis Diarthrosis, synarthrosis, and symphysis, are to be considered as the genera only of articulations, each genus comprehending several species, which are arranged as follows

Genera *Species.*

Diarthrosis

Enarthrosis, when the round head of one bone is received into the deep cavity of another, so as to admit of motion in every direction as the head of the os femoris with the acetabulum of the os innominatum

Arthrodia, when the round head of a bone is received into a superficial cavity of another, so as to admit of motion in every direction, as the head of the humerus with the glenoid cavity of the scapula

Ginglymus, when the motion is only flexion and extension thus the tibia is articulated with the os femoris, and the cubit and radius with the os humeri

Trochoides, when one bone rotates upon another, as the first cervical vertebra upon the odontoid process of the second, and the radius upon the ulna, or cubit

Amphiarthrosis, when there is motion, but that very obscure, as the motion of the metacarpal and metatarsal bones

Synarthrosis.

Suture, when the union is by means of dentiform margins; as in the bones of the cranium, hence the sagittal, lambdoidal or occipital, and coronal sutures.

Harmony, when the connexion is by means of rough margins, not dentiform as in the bones of the face

Gomphosis, when one bone is fixed within another, like a nail in a board; as the teeth in the alveoli of the jaws

Symphysis

Synchondrosis, when a bone is united with another by means of an intervening cartilage, as the vertebræ and bones of the pubis

Syssarcosis, when a bone is connected with another by means of an intervening muscle; as the os hyoides with the sternum

Syneurosis, when a bone is united to another by an intervening membrane, as the bones of the head of the fetus

Syndesmosis, when a bone is connected to another by means of an intervening ligament, as the radius with the ulna, &c

Synostosis, when two bones, originally separated, are united to one another by bony matter, as the occipital bone with the sphænoid,

Cartilages are white, elastic, glistening substances, growing to the bones by a deposition of calcareous matter in their cells They are divisible into obducent, which cover the articulatory surfaces of bones; interarticular, which are not accreted to the bones, but adhere to the capsular ligament, and lie between the articulating extremities, as in the knee-joint, &c, and uniting cartilages, which unite bones firmly together, as the symphysis pubis, bodies of the vertebræ, &c

They lubricate the articulation of the cartilages, to connect some bones by an immoveable connexion, and to facilitate the motion of some articulations

The diseases of cartilages are little, if at all, understood

The periosteum is a membrane which invests the external surface of all the bones except the crowns of the teeth. It assumes different names in different positions. Thus it is called pericranium, on the cranium, periorbita, on the orbits; perichondrium, when it covers cartilages; and peridesmium, when it covers ligaments.

Ligaments, like cartilages, partake of the nature of bones deprived of their calcareous matter, or phosphat of lime. They are elastic and strong membranes uniting the extremities of the moveable bones, and from their form or position are called either capsular or connecting

The capsular ligaments connect the extremities of the moveable bones, and prevent the efflux of synovia, the external and internal connecting ligaments strengthen the extremities of the moveable bones

MYOLOGY; OR, DOCTRINE OF THE MUSCLES

A muscle is a fibrous body for the most part communicating with the sensorium, and producing motion under its influence It is divided into head, belly, and tail The head and tail are firmly attached to the bones, the place of attachment of the former is called its origin, it is usually that part nearest the trunk of the body the latter is termed the insertion, which is more remote from the general body, and is implanted into the part to be moved The body adheres laxly to other parts by means of the cellular membrane, in order that it may swell when the muscle acts

It is fleshy in its belly, tendinous in its extremities. The former is composed of fleshy fibres, which are irritable and sensible, the latter of white fibres, which are neither sensible nor irritable When the extremity of a muscle is rounded, it is called a tendon; when broad and expanded, aponeurosis, and sometimes fascia

Muscles derive their names from the arrangement of their fibres, their action, their origin and insertion, their figure or situation thus, when the fibres of a muscle proceed in the same direction, it is said to be simple, when they are in rays, radiated, when arranged like the plume of a feather, penniform, and, when two penniform muscles are contiguous, the union is a compound penniform Muscles sometimes surround certain cavities of the body, forming a thin lamina, as in the intestinal canal, bladder, &c When they are situated around any aperture so as to shut or open it, they are termed sphincters Many muscles are named from their action, as the flexors, extensors, depressors, levators, corrugatores supercilii, &c The muscles which receive names from their origin and insertion are very numerous, as the sterno-cleido-mastoideus, stylo hyoideus, stylo-glossus, &c, the deltoid, pectineus, pyramidalis, &c are named from their figure; and the pectoralis, lingualis, temporalis, pterygoideus, &c from their situation Muscles that concur in producing the same action, are called congeneres; and those that act contrary to each other, antagonists Most muscles are in pairs: those which

are single are distinguished in the following sketch by an asterisk *

Muscles of the Integuments of the Cranium.

Occipito-frontalis* —Epicranius Occipitalis et frontalis Digastricus capitis —A broad, thin, muscular expansion, arises from the upper ridge of the occipital bone, covers the back part of the head, from the mastoid process of one side around to that of the other side, becomes a flat aponeurosis on the top of the head, and is inserted into the skin and eyebrows, and the bone in that neighbourhood The use of this muscle is to pull the skin of the head backwards, to raise the eyebrows, and corrugate the skin of the forehead

Corrugator supercilii —Appears like a slip of the former, arises above the root of the nose, and is inserted among the fibres of the occipito-frontalis Its use is, to wrinkle the eyebrows, by drawing them together.

Muscles of the Eyelids

Orbicularis palpebrarum.—Arises from, and is inserted by the same small tendon at the inner angle of the orbit Surrounds the eye, and squeezes it with violence when injured by dust or other substances

Levator palpebræ superioris.—Arises by a flat tendon deep within the orbit, near the optic foramen, becomes fleshy as it passes the eyeballs, and ends in the eyelid by a broad expansion of muscular fibres which finally terminate in a short flat tendon Opens the eye by raising the upper eyelid

Muscles of the Eyeball

The eyeball is completely surrounded by muscles, which move it in every direction They arise from the very bottom of the orbit, around the optic foramen, and are implanted into the upper, under, and lateral surfaces of the sclerotic coat of the eye, and the expansions of their colourless tendons form the tunica adnata, or white of the eye these muscles are termed recti

Rectus superior —Attollens oculi Levator oculi Superbus —Lifts the eye directly upwards, and is expressive of pride and haughtiness

Rectus inferior —Deprimens oculi Humilis —Directly opposite to the former muscle, and expressive of modesty and submission

Rectus internus —Adducens oculi Bibitorius —Moves the eye towards the nose

Rectus externus —Abductor oculi Indignabundus —Turns the eye outwards When the recti muscles all act in succession they roll the eye, but if they act all at once, the eye is immoveable

Besides these, there are two whose action turns the eye obliquely

Obliquus superior —Longissimus oculi Trochlearis —Arises with the former, from the bottom of the orbit, by a slender tendon, passes the upper part of the eyeball fleshy, then forms a smooth round tendon, which passes through a cartilaginous pulley in the margin of the orbit, and returns down to be inserted in the middle of the eyeball

Obliquus inferior.—Brevissimus oculi —Opposed to the former in form, place, and office Arises from the nasal process of the superior maxillary bone, in the edge of the orbit, and passes obliquely backwards and outwards under the ball of the eye, to be inserted opposite to the obliquus superior

Muscles of the Nose and Mouth

Levator labii superioris alæque nasi —Pyramidalis Dilator alæ nasi —Arises by a small double tendon from the nasal process of the superior maxillary bone, spreading as it passes down the nose to be inserted by two fascicles, one into the cartilage of the nose and the other into the upper lip Use, to raise the upper lip, and dilate the nostrils

Levator labii superioris proprius —Musculus incisivus —Arises immediately under the edge of the orbit, and above the incisors, by a broad flat origin, and runs downwards and obliquely inwards to the middle of the lip, where it meets its fellow Pulls the upper lip directly upwards.

Levator anguli oris —Levator labiorum communis Caninus —Origin between the infra-orbitar foramen of the superior maxillary bone and the first molaris immediately above the canine tooth Is inserted into the fibres of the orbicularis oris, at the corner of the mouth, so that it raises the angle of the mouth upwards

Zygomaticus major —Distortor oris —Arises from the cheek bone, near the zygomatic suture, runs downwards and inwards to the corner of the mouth, and is lost in the fibres of the orbicularis oris, and depressor of the lip Its action is that of distorting the mouth in laughter, raging, grinning, &c

Zygomaticus minor —Arises higher than the former from the cheek bone Is much more slender than the major, and is often wanting

Buccinator —Forms the sides of the cheek Arises chiefly from the coronoid process of the lower jaw, and from the superior maxillary bone close by the pterygoid process of the sphenoid bone, and proceeds directly forwards to be implanted into the corner of the mouth In its middle it is perforated by the duct of the parotid gland Use, to flatten the cheek, assist in swallowing liquids, turning the morsel in the mouth while chewing in blowing wind instruments, it both receives and expels the wind, hence its name

Depressor anguli oris —Triangularis labiorum —Arises fleshy from the edge of the lower jaw Gradually grows smaller as it runs upwards to be implanted in the angle of the mouth, which it draws downwards shape triangular.

Depressor labii inferioris —Quadratus genæ —Arises under the depressor anguli oris, and goes obliquely upwards and inwards, until it meets its fellow in the middle of the lip, where it mixes with the fibres of the orbicularis. Pulls the lip downwards shape square

Orbicularis oris*.—Constrictor oris Sphincter oris Osculator Semi orbicularis superior et inferior Nasalis labii superioris.—Surrounds the mouth after the manner of the orbicularis oculi, and constituting the thickness of the lips Crosses its fibres at the angles of the mouth, which has induced some to consider it as two semicircular muscles Often there is a small slip going from the middle of the upper lip to the nose, called nasalis labii superioris. Contracts the mouth, and antagonizes with the muscles inserted into it shape round

Depressor labii superioris alæque nasi.—Incisivus medius Constrictor, vel compressor alæ nasi Very small, concealed under the former Arises from the socket of the fore teeth, and goes into the root of the cartilage of the nose and upper lip, which it pulls down

Constrictor nasi.—Compressor nasi.—A small scattered bundle of muscular fibres which crosses the cartilage of the nose and goes to the very point of the nose, meeting on the top with its fellow.

Levator menti.—Levator labii inferioris. Incisivus inferior.—Arises from the lower jaw, at the root of the incisors and is inserted into the skin on the very centre of the chin. Draws the centre of the chin into a dimple, and moves the lip at the same time.

Muscles of the external Ear.

Superior auris.—Attollens.—A very thin flat expansion of muscular fibres, scarcely distinguishable from the fascia of the temporal muscle, upon which it lies. Arises broad and circular from the expanded tendon of the occipito-frontalis and is inserted narrow into the root of the cartilaginous tube of the ear. Appears to have been intended to lift the ear upwards.

Anterior auris.—A delicate, thin, narrow expansion, arising from near the back part of the zygoma, and inserted into the eminence behind the helix. Frequently not to be distinguished from the former. Use, to raise the eminence forwards.

Posterior auris.—Retrahens auris. Triceps auris.—Small, delicate, thin, arising by three narrow distinct slips from about the mastoid process of the temporal bone, and going directly forwards to be inserted into the concha. Use, to draw the ear back and stretch the concha.

Helicis major.—Arises from the anterior and acute part of the helix, is inserted into the cartilage of the helix, a little above the tragus. Depresses the upper part of the helix.

Helicis minor.—Arises lower than the former, and is inserted into the crus of the helix. Use, to contract the fissure.

Tragicus.—Lies upon the concha, and stretches to the tragus. Depresses the concha, and pulls the tragus a little outwards.

Antitragicus.—Very small, lying in the antitragus. Dilates the mouth of the concha.

Transverus auris.—Arises from the upper part of the concha, and is inserted into the inner part of the helix. Draws these parts together.

Muscles of the internal Ear.

Laxator tympani.—Arises from the spinous process of the sphænoid bone, and proceeds into the cavity of the tympanum to be inserted into the long process of the malleus. Use, to draw the malleus obliquely forwards towards its origin.

Tensor tympani.—Arises from the cartilaginous extremity of the Eustachian tube, within the tympanum, and is inserted into the manubrium of the malleus. Pulls the malleus and membrana tympani inwards.

Stapedius.—Arises from a little cavern in the tympanum, near the cells of the mastoid process, and passes in a bony furrow to be inserted into the posterior part of the head of the stapes, which it draws upwards.

Muscles of the lower Jaw.

Temporalis.—Very large, and arises from a semicircular ridge in the lower part of the parietal bone, and from the sphænoid, temporal, and frontal bones in the hollow behind the eye, where they meet to form the squamous suture, and from the aponeurosis which covers it. Its fibres are bundled together, and pass in a narrow compass under the zygoma to be inserted all around the coronoid process of the lower jaw. Use, to pull the lower jaw upwards, which it does very powerfully.

Masseter.—Short, thick, fleshy, giving roundness to the back part of the cheek. Arises from the superior maxillary bone, near its junction with the cheek bone, and also from the lower edge of the zygoma, and passes over the coronoid process of the lower jaw, and covers that part of the jaw quite down to its angle, where it is inserted. The parotid gland lies on the upper part of the masseter, and its duct passes over it as it crosses the cheek. Its office is the same as the temporalis.

Pterygoideus internus.—Pterygoideus minor.—Arises from the internal or flat pterygoid process of the sphænoid bone, and passes downwards and outwards to be inserted into the angle of the jaw on its inside. Raises the jaw, and draws it a little to one side.

Pterygoideus externus.—Pterygoideus major.—Arises from the external pterygoid process, and passes directly outwards, to be implanted into the lower jaw, just below the capsular ligament, to a part of which it is connected. Use, to move the jaw, and prevent the capsular ligament from being pinched.

Muscles which appear about the anterior part of the neck.

Platysma myoides.—Musculus cutaneus. Latissimus colli. Quadratus genæ.—Delicate, flat, and expanded, arises from the cellular membrane covering the pectoral and deltoid muscles. Its fibres pass upwards to be inserted into the side of the chin and integuments of the cheek. Pulls the skin of the cheeks and face downwards.

Sterno-cleido-mastoideus.—Sterno-mastoideus, and cleino mastoideus. Mastoideus.—Arises from the upper part of the sternum, and by another head from the fore part of the clavicle. These two portions pass upwards and outwards, unite and form a big, strong, round muscle, inserted into the mastoid process. When one of these muscles acts, the head is pulled to one side; but, when both contract together, the head is bent forward.

Muscles situated between the lower Jaw and os Hyoides.

Digastricus.—Biventer maxillæ inferioris.—Arises fleshy from the notch along the root of the mastoid process of the temporal bone, goes obliquely forwards and downwards, and becomes a long, thick, and round tendon, which perforates the stylo hyoideus muscle, and is affixed by a tendinous bridle to the os hyoides, then turning upwards towards the chin, becomes again fleshy, and is inserted into the lower and anterior part of the chin. When the jaw is fixed, as in swallowing, this muscle raises the os hyoides, but when the os hyoides is fixed, it pulls down the jaw.

Mylo-hyoideus.—Flat and broad, arising from the whole semicircle of the lower jaw internally, and proceeding with very regular straight fibres to the basis of the os hyoides. Is divided from its fellow by a white tendinous line, which extends from the symphysis of the jaw to the os hyoides. When these muscles contract, the os hyoides is moved upwards.

Genio hyoideus.—Musculus polychrestus.—Arises from the rough point of the chin, and pro-

ceeds downwards, becoming flat and broad, to be implanted into the basis of the os hyoides When the jaw is fixed, these muscles move the os hyoides forwards and upwards, and when the os hyoides is fixed, they pull the jaw down

Genio-glossus.—Arises by a narrow pointed origin from the rough tubercle behind the symphysis of the chin, spreads out like a fan as it proceeds towards the tongue whose substance it chiefly forms. Moves the tongue in various directions.

Hyo-glossus —Basio-glossus Chondro-glossus Cerato-glossus. Basio-chondro cerato-glossus — Arises by three fasciculi (one from the basis, one from the horn, and the other from the cartilage of the os hyoides), which proceed upwards with very slight marks of any division, to be inserted into the side of the tongue, which they pull downwards, when both act, the tongue is made somewhat round.

Lingualis.—Arises from, and is inserted into the tongue It is an irregular bundle of fibres, which runs along the side between the stylo-glossus and the genio-glossus, unconnected with any bone The tongue is shortened and drawn backwards by these muscles

Muscles situated between the Os Hyoides and trunk.

Sterno-hyoideus —Flat, broad, riband-like, arises from the upper part of the sternum, rather within the breast, and partly also from the clavicle and cartilage of the first rib, and goes straight up to be implanted into the base of the os hyoides, which it draws downwards

Omo hyoideus —Coraco hyoideus —Very long muscle, arising from the scapula near the coracoid process, and passing around the throat to be inserted into the side of the os hyoides When one of these muscles acts, the os hyoides is pulled to one side, and when both act, it is pulled downwards

Sterno thyroideus —Lies under the sterno hyoideus, which it very much resembles, except that it is much shorter Arises immediately under it, from the sternum and cartilage of the first rib, and goes upwards to be inserted into a rough ridge in the thyroid cartilage, which it pulls downwards.

Hyo-thyroideus —Thyreo hyoideus —Arises from the basis and horn of the os hyoides, and goes down to be implanted into the lower border of the thyroid cartilage Raises the thyroid cartilage and depresses the os hyoides

Crico thyroideus —Passes from the upper edge of the cricoid to the lower margin of the thyroid cartilage. It pulls the thyroid towards the cricoid cartilage

Muscles situated between the lower Jaw and Os Hyoides laterally

Stylo-glossus —Arises from the styloid process of the temporal bone, goes obliquely downwards and forwards to be inserted into the side of the tongue in a radiated form, so as to make part of the flesh of the tongue Its office is to pull the tongue backwards into the mouth

Stylo-hyoideus.—Stylo-hyoideus alter —Arises, like the former, from the styloid process, and goes obliquely downwards and forwards to be inserted into the side of the os hyoides Just above its insertion, its fibres are slit so as to form a small loop for the tendon of the digastricus to pass through. Sometimes accompanied by a small fleshy muscle, called stylo-hyoideus alter Draws the os hyoideus upwards

Stylo-pharyngeus —Arises from the root of the styloid process Long and slender expanding its fibres upon the side of the pharynx. Lifts the pharynx up to receive the food, and then straightens and compresses it to push the morsel down the œsophagus

Circumflexus palati —Tensor palati Palato-salpingus Staphilinus externus Sphæno salpingo-staphilinus. Musculus tubæ Pterygo staphilinus —Arises from the spinous process of the sphænoid bone, and the beginning of the Eustachian tube along with which it runs down betwixt the pterygoid processes, it then becomes tendinous, and turns around the hamulus of the pterygoid process to ascend again to the side of the velum hence, when in action, the soft palate is made tense, by being drawn downwards

Levator palati mollis —Salpingo staphilinus Sphæno staphilinus. Pterygo staphilinus Petro-salpingo staphilinus.—Arises from the point of the petrous portion of the temporal bone, from the Eustachian tube, and the sphænoid bone, from which it descends to the velum pendulum palati, and spreads out in it When these muscles contract, the soft palate is raised against the posterior opening of the nostrils, and the opening of the Eustachian tube, whilst any thing is passing into the pharynx.

Muscle situated about the entry of the Fauces

Constrictor isthmi faucium —Glosso staphilinus —Arises from the very root of the tongue on each side, goes round the middle of the velum, and ends in the *uvula* This semicircle forms the first arch which presents itself when looking into the mouth Its office is to pull down the soft palate, and raise the root of the tongue at the same time

Palato-pharyngeus —Salpingo-pharyngeus —Arises in the middle of the soft palate, proceeds around the entry of the fauces, forming the second arch in the mouth, and ends in the edge of the thyroid cartilage. Assists in contracting the arch of the fauces.

Azygos uvulæ.—A slip of straight fibres which goes directly down from the peak of the palate bones to the uvula, which it pulls directly upwards.

Muscles situated on the superior part of the Pharynx

Constrictor pharyngis inferior.—Arises partly from the thyroid and partly from the cricoid cartilage, and meets its fellow in a tendinous middle line Assists in pushing down the morsel through the pharynx

Constrictor pharyngis medius.—Arises from the round point of the os hyoides and its cartilage, and is inserted into the ambit of the pharynx, its uppermost part touching the occipital bone. Compresses the pharynx, and at the same time draws the hyoid bone upwards

Constrictor pharyngis superior.—Arises from the basis of the cranium, [illegible] and root of the tongue, and surrounds, with its fellow, the upper part of the pharynx, which it moves upwards and forwards, and also compresses

Muscles situated about the Glottis

Crico-arytænoideus posticus.—Arises broad from the back part of the cricoid cartilage, and goes directly upwards to be inserted by a narrow point into the back of the arytænoid cartilage

This pair of muscles pulls the arytænoid cartilage directly backwards, and lengthens the rima glottidis

Crico arytænoideus obliquus—Crico-arytænoideus lateralis—Arises from the side of the cricoid cartilage, and goes obliquely to be inserted into the side of the arytænoid Opens the glottis

Thyreo arytænoideus.—Arises from the back of the wing of the thyroid cartilage, from the hollow, and is inserted into the fore part of the arytænoid cartilage Widens the glottis by pulling the arytænoid cartilage forward

Arytænoideus obliquus—Arises from the root of each arytænoid cartilage, and goes obliquely upwards to the points of the opposite one Draws the cartilages together, and closes the glottis

Arytænoideus transversus*—Arises from the whole length of one arytænoid cartilage, and goes across to be implanted into the whole length of the opposite one By drawing these cartilages together, the glottis is contracted

Thyreo-epiglottideus—Arises from the thyroid cartilage, and is inserted into the side of the epiglottis Pulls the epiglottis obliquely downwards

Arytæno-epiglottideus—Arises from the upper part of the arytænoid cartilage laterally, and is inserted into the side of the epiglottis, which it moves outwards

Muscles situated on the anterior part of the abdomen

Obliquus externus—Obliquus externus descendens Obliquus major descendens Declivis—The outermost of all the abdominal muscles, arises by distinct fleshy tongues, from the eight lower ribs Its fibres pass down in one parallel direction with each other, but oblique with respect to the abdomen Its fleshy belly ceases about the middle of the side, and becomes a flat tendon, which goes over the fore part of the belly, until it meets its fellow in the middle This meeting of the tendons, along with that of the other muscles to be described forms a white line extending from the pubis to the sternum, called linea alba. It compresses the abdomen, hence its utility is very considerable in expiration, evacuation of the feces, urine, fetus, &c

Obliquus internus.—Obliquus internus ascendens Obliquus minor—Arises fleshy from all the circle of the spine of the ilium, and by a thin tendon, common with the serratus and latissimus dorsi, from the three lower spinous processes of the loins From the spine of the ilium it ascends upwards in a radiated direction, and crosses the abdomen to the linea alba, its higher fibres reaching the sternum, and the lower ones the pubis Its flat tendon is inserted into the cartilages of all the false ribs, into the sternum, and into the linea alba, throughout its whole length Acts in conjunction with the former

Transversalis abdominis.—Arises fleshy from the inner surface of the six lower ribs, from the transverse processes of the four last lumbar vertebræ, from the whole spine of the ilium, and from part of Poupart's ligament Its fibres run directly across the abdomen, and are inserted tendinous into the whole length of the linea alba Acts in conjunction with the two former in compressing the abdomen.

Rectus abdominis.—Covers the fore part of the abdomen, in a line between the sternum and pubis, one muscle on each side the linea alba, and is enclosed all this way by a sheath of tendon, formed by a separation of those of the oblique, which are uppermost, from that of the transversalis, which lies underneath Origin fleshy from the outside of the sternum, proceeds about four inches in breadth all down the abdomen, and inserted by a short flat-pointed tendon on the side of the symphysis of the pubis Crossed at intervals by four tendinous intersections The recti muscles not only compress the abdomen, but bring the trunk forwards towards the pubis

Pyramidalis—Small and triangular, arises from the side of the symphysis pubis, and is inserted a little above into the linea alba Use, to assist the rectus in drawing down the sternum, and tighten the linea alba

Muscles about the Male Organs of Generation

Cremaster—A number of fleshy fibres which arise about the ring and Poupart's ligament, and run downwards to be inserted into the tunica vaginalis testis When this flat sheet of fibres contract, the testicle is drawn upwards

Erector penis—Collateralis penis. Ischio cavernosus—Lies along the crus penis on each side Arises by a slender tendon from the tuberosity of the ischium, and goes fleshy, thin, and flat over the crus penis to be inserted about two inches up into the crus of the penis The pair is supposed, by pressing the penis against the pubis, to compress the vena magna ipsius penis, and so cause an erection

Accelerator urinæ—Ejaculator seminis—Arises from the sphincter of the anus and a little above the bulb of the urethra, and meets its fellow in a white tendinous line along the lower part of the bulb of the urethra, so that they surround the whole of the bulb Use, to compress the urethra in emptying it of the last drops of urine, and to expel forcibly the semen, which they do with a kind of involuntary or convulsive action

Transversalis perinæi—Transversalis penis Transversalis perinæi alter—Arises by a delicate tendon from the tuberosity of the ischium, and crosses the perinæum to be inserted into the very back part of the bulb of the urethra There is occasionally another muscle accompanying it, called transversalis perinæi alter Chief use, to prevent the anus being too much protruded in discharging the fæces

Muscles of the Anus

Sphincter ani*—A broad circular band of muscular fibres surrounding the anus Arises from a point of the os coccygis behind, and sends a neat slip forwards, by which it is attached to the back part of the accelerator urinæ When it contracts, the anus is shut

Levator ani*—Musculus ani latus—Arises from the internal surface of the fore part of the pelvis, its origin being continued from the internal pubis all the way round to the sacrum Grows gradually smaller as it goes downwards to surround the anus, and is inserted into the circle of the anus, the point of the os coccygis, and is mixed with the sphincter ani Raises the anus, dilates it, and supports it during the evacuation of the fæces

Muscles of the Female Organs of Generation

Erector clitoridis—Small and delicate, arising from the internal part of the crus of the ischium, and inserted into the upper part of the crus, and into the body of the clitoris Use, to draw the clitoris downwards, and make it tense

Sphincter vaginæ *—A circular bundle of fibres arising from the sphincter ani and sides of the vagina, which it surrounds, and inserted into the union of the crura clitoridis It contracts the entrance of the vagina

Muscles situated within the Pelvis

Obturator internus —Marsupialis Bursalis —Arises from all the internal surface of the obturator ligament, from the edges of the foramen thyroideum within the pelvis, and comes out by turning round the ischium in the notch between the tuberosity and the spine of the ilium, proceeds between the crura of the gemini and its tendon, is united to theirs, and inserted with them by one common tendon into the root of the great trochanter Rolls the thigh obliquely outwards

Coccygeus —Arises by a narrow point from the inside of the spinous process of the ilium, and is inserted, after being expanded, fleshy into the whole length of the os coccygis Pulls the point of the os coccygis upwards.

Muscles situated within the cavity of the Abdomen

Diaphragma* —Septum transversum —Midriff A transverse vaulted muscle, dividing the cavity of the thorax from that of the abdomen Arises by one broad fleshy attachment from all the lower borders of the chest, and this fleshy origin constitutes what is considered by some as the upper or greater muscle of the diaphragm Arises also by many small tendinous feet from the fore part of the loins, which soon unite in two fleshy bellies, termed the crura diaphragmatis, which, meeting form what is termed the lesser muscle of the diaphragm The middle of the diaphragm is a strong aponeurosis, and is distinguished by the epithet of centrum tendinosum The shape of this tendinous centre is determined by the fleshy bellies, the large one above almost surrounds it, and the lesser one below meeting the larger, the two divisions give it a pointed form behind, not unlike a trefoil leaf, or the ace of hearts. The tendinous centre is fixed to the spine, so that the two sides form two convexities in the cavity of the chest

Quadratus lumborum —A flat, oblong, muscle, arising fleshy from the back part of the os ilium and ligaments of the pelvis, which tie the back part of the ilium to the side of the sacrum and transverse processes of the lumbar vertebræ It goes upwards to be inserted into the points of the transverse processes and the lower edge of the last rib Supports the loins, and draws the spine to one side

Psoas parvus —A muscle of the loins which arises from the last dorsal and first lumbar vertebræ, and passes down by the side of the psoas magnus to be inserted into the brim of the pelvis, near the acetabulum Is often wanting It bends the loins forwards

Psoas magnus —A very long and fleshy muscle filling the space upon the sides of the spine Arises by an upper head from the last vertebra of the back, then successively from each lumbar vertebra, not only from the sides of their bodies, but likewise from their transverse processes Then descends thick, round, and fleshy, to be united with the internal iliac muscle, under Poupart's ligament, and the common tendon then bends obliquely round to be inserted into the lesser trochanter The psoas muscles are in constant use in moving the thigh forwards, and supporting the pelvis upon the thigh-bone

Iliacus internus —Arises from the inner edge of the crista of the ilium, and adheres to the concavity of that bone down to the brim of the pelvis, to the fore part of the bone under the spinous process All its radiated fibres are gathered together into a tendon under Poupart's ligament, where it unites with the psoas, and the common tendon turns obliquely round to be inserted into the less trochanter Acts in conjunction with the psoas in moving the thigh forwards

Muscles on the anterior part of the Thorax

Pectoralis major —A large, thick, and fleshy muscle which covers all the breast Arises from the clavicle next the sternum, from the edge of the sternum and the cartilaginous endings of the fifth and sixth ribs All its fibres converge to form a flat twisted tendon, which goes before the armpit to be inserted into the edge of the groove in the humerus for the tendon of the biceps When this muscle contracts, the arm is brought forwards obliquely

Subclavius —Subclavianus —A small muscle concealed under the clavicle Arises by a flat tendon from the cartilage of the first rib and is inserted fleshy into a great part of the clavicle Use to fix the clavicle more firmly

Pectoralis minor —Serratus minor anticus —Lies underneath the pectoralis major close upon the ribs Arises thick and fleshy from the third fourth, and fifth ribs, its fibres all converge to form a thick fleshy point, to be inserted into the very apex of the coracoid process of the scapula Pulls the scapula directly forwards

Serratus major anticus —Covers the side of the chest Arises by sharp pointed slips or digitations from all the true ribs except the first, and from three of the false ribs Proceeds upwards and backwards to form a fleshy cushion as it were, for the scapula, and its fibres all converge to be inserted into the basis of the scapula Pulls the scapula downwards and forwards

Muscles between the Ribs, and within the Thorax

Intercostales externi —Forming an external layer of muscular fibres between the ribs They run from the spine towards the sternum

Intercostales interni —Running from before backwards underneath the former, and crossing them Both assist inspiration by raising the ribs

Sterno costalis —Triangularis sterni —Three or four slips of muscles, arising from the ensiform cartilage, and going over the middle of the sternum to be inserted into the second, third, and fourth rib Its office is to depress the rib.

Muscles on the anterior part of the Neck close to the Vertebræ.

Longus colli —One layer formed by four muscles Arises, within the thorax, from the fore part of the bodies of the three upper dorsal vertebræ, and from the transverse processes of the four last vertebræ of the neck, and is inserted into the fore part of the second cervical vertebra, where the opposite large muscles meet. Pulls the neck to one side, and, with its fellow, the head and neck directly forwards.

Rectus internus capitis major —Arises from the transverse processes of the five lower cervical vertebræ, and proceeds obliquely to be inserted into the cuneiform process of the occipital bone, just before the foramen magnum occipitale Pulls the head and neck directly forwards

Rectus internus capitis minor.—Very small, and immediately underneath the former. Arises from the fore part of the atlas, and goes obliquely inwards to be inserted into the occipital bone, near the condyle. Assists the former.

Rectus capitis lateralis.—Very small, like the former. Arises from the transverse processes of the atlas, and is inserted into the side of the cuneiform processes of the os occipitis. Lies immediately under the exit of the internal jugular vein. Moves the head to one side; and, when both act, they assist the former muscles in pulling the head forwards.

Muscles on the posterior part of the Trunk.

Trapezius.—Cucullaris.—These cover the back part of the neck and shoulders, extending from the tip of one shoulder to the tip of the other, and from the nape of the neck quite down to the loins, hence it has been compared to a monk's cowl hanging back upon the neck. Each arises by a strong tendon from the most pointed part of the os occipitis, and along the transverse spine to the mastoid process: from this point, all down the neck, it has no hold of the vertebræ, but arises from the ligamentum nuchæ: it then arises from the spines of the two last cervical vertebræ, and those of the back. From this long origin, its fibres converge into one point, the tip of the shoulder, to be inserted into the scapular end of the clavicle, the acromion of the scapula, and the whole length of its spine. The trapezius is chiefly a muscle of the scapula: it also bends the neck and head backwards.

Latissimus dorsi.—The broadest muscle of the whole body.—Covers all the lower part of the back and loins. Arises by a broad flat tendon in the middle of the back, loins, and sacrum, and fleshy from the circle of the ilium. The tendon gradually becomes a flat regular muscle; proceeds upwards, passes over the corner of the scapula, from which it receives a small fleshy bundle, and several smaller ones as it passes over the ribs; then becomes a twisted tendon, passes into the axilla, and turns under the os humeri to be inserted into the inner edge of the groove of the tendon of the biceps. Thus it appears, that the anterior part of the axilla is formed by the pectoralis major, and the posterior by the latissimus dorsi: hence they support the whole body when on crutches. The latter muscle brings the arm down, when raised, as in striking with the hammer; and downwards and backwards, as in knocking with the elbow; it also turns the palm of the hand behind the back.

Serratus posticus inferior.—Very broad and thin; situated in the lower part of the back, under the former. Arises from the three lower dorsal and four [illegible] lumbar vertebræ. Soon becomes [illegible] into three or four slips, each of which [illegible] separately into the ninth, tenth, eleventh, [illegible] lower ribs, near their cartilages. [illegible] downwards and backwards.

Rhomboides [illegible] major et minor.—[illegible] between the spine and the whole [illegible] of the basis of the scapula. Arises partly from the [illegible] spinous processes of the cervical [illegible] goes across to be inserted into the [illegible] of the basis of the scapula; and partly from the spinous processes of the four first dorsal [illegible] whence it goes directly across under the [illegible] to be implanted into the lowermost [illegible] basis [illegible] scapula: generally considered [illegible] muscles, though at times [illegible]sion, and most frequently only a partial one: use to move the scapula upwards and backwards.

Splenius.—Splenius capitis. Splenius colli.—Lies immediately under the trapezius and above the complexus, and is named splenius, from its lying like a surgical splint along the side of the neck. Flat and broad, arising from the four uppermost spinous processes of the back and five lowest of the neck, proceeds upwards and outwards to be implanted into the whole length of the occipital ridge, and mastoid process of the temporal bone. Immediately under this portion is another arising with it, but terminating by four or five distinct tendons in the transverse processes of the upper cervical vertebræ. This portion is considered by some as a distinct muscle, and called splenius colli, and the former splenius capitis. When the muscle of one side acts, the head is pulled backwards to one side; when both act, it is drawn directly backwards; and when the muscle of one side with the sterno-cleido-mastoideus of the same side act together, the ear is brought down upon the shoulder.

Serratus superior posticus.—On the poste[illegible] part of the chest, over the splenius. Arises [illegible] flat and shining tendon from the spinous [illegible] of the lower cervical and two uppermost dorsal vertebræ, and goes obliquely downwards under the upper corner of the scapula to be inserted into the second, third, and fourth ribs, by three fleshy digitations. They elevate the ribs.

Spinalis dorsi et cervicis.—One long mass of muscular and tendinous fibres going from spine to spine along the whole length of the back and neck. Raises the spine.

Levatores costarum.—Supra costales. Levatores costarum longiores.—Twelve on each side, for the distinct purpose of raising the ribs. Arise from the transverse processes of the last cervical and eleven uppermost dorsal vertebræ, and go down to the angle of each rib. The three last are twice as long as the others.

Sacro lumbalis.—Additamentum ad sacro lumbalem. Musculi accessorii. Arises by a tendon common to it and the longissimus dorsi, from all the spinous processes of the lumbar vertebræ; from the spines of the sacrum, and back part of the os ilium. Just opposite the lowest rib the tendons separate; and the sacro lumbalis goes away to be inserted by a flat tendon into each rib. From the surface of the six or seven lowest ribs arises a small slip, which mixes with the substance of this muscle: these slips are termed additamenta ad sacro-lumbalem, and sometimes musculi accessorii. There is also a fleshy slip connected with the sacro-lumbalis, sometimes described as a distinct muscle, when it is termed cervicalis descendens.

Cervicalis descendens.—Connected with the former, arises from the transverse processes of the five lower cervical vertebræ, and passes downwards small and slender to be inserted into the six uppermost ribs. Turns the neck obliquely backwards, and to one side.

Longissimus dorsi.—Round, thick, and firm, filling up the hollow betwixt the spine and the angle of the ribs. Arises by a tendon common to it and the former muscle, and is implanted by two distinct sets of insertions into the heads of the ribs and the transverse processes of the vertebræ. Chief use to assist in returning the spine to the erect posture, and to keep it erect.

Transversalis colli.—Arises from the five upper transverse processes of the dorsal vertebræ, and

passes upwards to be inserted into the transverse processes of the neck

Complexus.—Implicatus Trigeminus Biventer cervicis Complexus major.—So called from the intricacy of its muscular and tendinous parts Lies immediately under the splenius, and arises by ten or more tendinous feet from the transverse processes of the four lower cervical and seven uppermost dorsal vertebræ It then becomes a large, thick, fleshy, and tendinous mass, filling up the hollow by the sides of the cervical spinous processes, and terminates by a broad fleshy head in the lower occipital ridge Draws the head backwards

Trachelo-mastoideus.—Complexus minor Mastoideus lateralis.—Arises from the transverse processes of the three first vertebræ of the back and the five lowest of the neck, and is inserted into the mastoid process When one muscle contracts, the head is drawn obliquely backwards, and when both act together, it is pulled directly backwards.

Levator scapulæ.—Levator proprius angularis Musculus patientiæ.—A small thin muscle which arises from the transverse processes of the four or five uppermost vertebræ of the neck, by as many distinct heads, which soon unite, and the muscle goes downwards to be inserted into the upper part of the scapula by a thin tendon. It pulls the scapula up, as in shrugging the shoulders

Semi spinalis dorsi.—Transverso-spinalis dorsi.—Arises from the transverse processes of the seventh, eighth, ninth, and tenth dorsal, and is inserted into the spinous processes of the four uppermost and last cervical vertebræ Extends the spine obliquely backwards

Multifidus spinæ.—Semi-spinalis internus, sive transverso-spinalis dorsi Semi spinalis, sive transverso-spinalis colli, pars interna Transversalis lumborum, vulgo sacer Transversalis dorsi Transversalis colli.—The many irregular portions of muscle, which authors have variously described, running from the sacrum all along the spine to the vertebræ of the neck, are comprehended under the name of multifidus spinæ Begins tendinous and fleshy from the upper part of the sacrum, from the oblique processes of the lumbar vertebræ, from the transverse processes, and from the oblique processes of the cervical vertebræ, and its many bundles are inserted into the spinous processes of the third or fourth, above that from which the bundle arose These muscles prevent the spine from being too much bent forwards, and also move the spine backwards

Spinalis cervicis.—Semi spinalis colli Transverso spinalis colli.—Arises from the transverse processes of the six uppermost dorsal vertebræ, and is inserted into all the spinous processes of the cervical vertebræ, except the first and last. Stretches the neck obliquely backwards

Rectus capitis posticus major.—Arises tendinous from the transverse process of the second cervical vertebra, and mounts up fleshy to be inserted into the lower occipital ridge Draws the head backwards

Rectus capitis posticus minor.—A shorter muscle than the former, arising tendinous from the middle of the first vertebra of the neck, and is inserted fleshy with the former into the lower occipital ridge Its action assists that of the major

Obliquus capitis superior.—The oblique muscles very much resemble the recti, except in their direction This arises from the transverse process of the atlas, and goes obliquely to be inserted into the end of the lower occipital ridge Assists in turning the head

Obliquus capitis inferior.—Arises from the spinous process of the second cervical vertebra and is inserted into the transverse process of the atlas Assists in turning the head quickly

Scalenus.—Scalenus, primus et secundus.—The ancients considered this as one triangular muscle It has since been distinguished as two, three [illegible] and even five distinct muscles It is, in fact, one great, flat, triangular muscle, stretching from the ribs to the neck, closing the thorax above, and giving passage to the nerves and vessels of the arm Arises from the transverse processes of the six lower cervical vertebræ One part of it is inserted into the flat part of the first rib close to its cartilage, another into the whole length of the outer edge of the first rib, and a third portion into the upper edge of the [illegible] [illegible] the head forwards, or pulls the neck to [illegible]

Interspinales.—[illegible] lumborum.—The muscular [illegible] tendinous fibres that pass from one spinous process to the next throughout the spine In the neck they are muscular, in the back, [illegible], in the loins, tendinous, or ligamentous, draw the spinous processes towards each other

Inter transversales.—Small muscles [illegible] strongest where there is most [illegible] between the transverse processes of the spine Draw these parts together

Muscles of the Superior Extremities

Supra-spinatus.—Occupies the hollow of the scapula above its spine Arises from the back spine and edge of the scapula, very thick and fleshy, and is enclosed by an aponeurosis [illegible] along the scapula under the acromion, and there becomes a tendon, which passes over the head of the humerus, to be inserted into the great tuberosity of the head of the humerus Raises the arm directly upwards,

Infra-spinatus.—Arises from the [illegible] back, and lower margin of the scapula, [illegible] cavity below the spine of the scapula [illegible] covered with a strong aponeurosis [illegible] the former muscle Becomes perfectly tendinous at the capsular ligament of the shoulder joint, to which it is attached, and then passes over it to be inserted into the great tuberosity of the humerus. Assists the former

Teres minor.—Is closely connected in its origin with the infra spinatus, long, small, and fleshy, arises from the angle and all the lower edge of the scapula, and accompanies the infra-spinatus to be attached to the capsular ligament, and then inserted into the great tuberosity of the os brachii Assists the former muscles in raising the arm

Teres major.—Thicker and longer than the former, situated below it, arises chiefly from the angle of the scapula, and is [illegible] with the teres minor and infra-spinatus [illegible] tendon passes under the long head of the [illegible] and is inserted into the ridge [illegible] the groove along with the tendon of the [illegible] dorsi Chief use, to draw the arm downwards and backwards

Deltoides.—Thick and fleshy, covers the top of the shoulder Arises from the outer end of the clavicle; from the point of the acromion of the scapula, and the spine of the scapula its muscular fibres converge over the shoulder, and form a flat strong tendon, inserted into the os brachii, one third down Use, to raise the arm

Coraco-brachialis.—Musculus perforatus Cas-

reus.—Long and rather slender, named from its origin and insertion. Arises fleshy from the coracoid process of the scapula, along with the short head of the biceps, which it accompanies, and is inserted by a short tendon into the middle of the os brachii. Raises the arm obliquely forwards and upwards.

Subscapularis.—Lines all the concavity of the scapula; shape triangular: is fleshy, thick, and strong; its fibres converge from their origin in the two edges and base of the scapula, to form a tendon whence it has a radiated or fan like appearance. The tendon accompanies that of the supra-spinatus and goes round the head of the humerus to be inserted into the lesser tuberosity of the os brachii. Rolls the arm inwards.

Muscles on the os brachii.

Biceps flexor cubiti.—Biceps. Biceps flexor brachii.—Very thick and strong, situated in the fore part of the arm. Arises by two distinct heads: one larger and thicker head, proceeds by a long tendon from the coracoid process of the scapula; the other, shorter, arises from the edge of the glenoid cavity of the scapula. About one third down the arm the two heads meet, and form a firm fleshy belly, which terminates in a tendon implanted into the tubercle on the fore part of the radius; a little below its neck sends off an aponeurosis just above the flexure of the arm. Bends the fore arm with great strength.

Brachialis internus.—Lies immediately under the biceps, which it assists. Arises by a forked head from two thirds of the os brachii at its fore part, and continues its attachment all the way down to within an inch of the joint. Is inserted by a flat tendon into the coracoid process of the ulna.

Triceps extensor cubiti.—Extensor longus. Extensor brevis. Brachialis internus. Situated on the back part of the arm, and was formerly described as three distinct muscles: arises by a long tendon from the edge of the scapula; by an outer head from the os brachii, just under the greater tuberosity; and by an internal head, which is the shortest, from the inside of the os brachii, just under the insertion of the teres major. All these heads unite and are continued downwards, adhering to the os brachii, to within an inch of the joint, where a strong, thick tendon is formed, which is implanted into the olecranon. Extends the fore-arm with considerable force.

Anconeus.—Small and triangular placed on the back part of the elbow. Arises from the external condyle of the os brachii, and is inserted into the back part or ridge of the ulna. Assists in extending the fore-arm.

Muscles situated on the fore arm.

Supinator radii longus.—Forms the very edge of the fore-arm; arises from the edge above the external condyle of the os brachii, becomes very fleshy as it passes the elbow joint, then tendinous and long, and is inserted into the radius near the styloid process. Assists in turning the palm of the hand upwards.

Extensor carpi radialis longior.—Arises from the ridge of the os brachii just above the external condyle: having become a thick fleshy belly, passes along the back of the radius, and forms a thin tendon, which passes over the wrist under the annular ligament, and is inserted into the root of the metacarpal bone of the fore finger. Extends the wrist.

Extensor carpi radialis brevior.—Almost the same in origin and use with the former. Inserted into the fore part of the metacarpal bone of the middle finger.

Extensor digitorum communis.—Covers the middle of the back part of the fore arm, and betwixt the extensor radialis secundus and the extensor minimi digiti. Arises from the outer condyle of the humerus, grows very fleshy and thick as it descends, and about the middle of the fore-arm divides into three slips. The tendons pass under the annular ligament, along the metacarpal bones and first phalanx of the fingers, where they are joined by those of the interossei and lumbricales, and form a tendinous sheath, which surrounds the back of all the fingers. Extends the fingers.

Extensor minimi digiti.—Auricularis.—Raises the little finger, as in picking the ear. Arises from the outer condyle of the humerus, and accompanies the extensor digitorum communis, passes under the annular ligament in a channel peculiar to it. Is inserted into the second joint of the little finger.

Extensor carpi ulnaris.—Arises from the external tubercle of the humerus, and proceeds along the ulnar edge of the arm to be affixed tendinous into the outside of the lower head of the metacarpal bone of the little finger. Use, to extend the carpus.

Flexor carpi ulnaris.—Arises tendinous from the inner condyle of the os humeri, and fleshy from the olecranon; proceeds fleshy along the lower edge of the arm: about the middle becomes tendon, and is inserted into the os pisiforme. The flexor carpi radialis with this muscle bend the wrist with great force; alone it pulls the hand sideways.

Palmaris longus.—Long and thin; arises from the internal condyle of the os humeri, forms a slender tendon and passes along the middle of the fore arm to be inserted into the annular ligament, just under the root of the thumb. Expands into an aponeurosis, and covers and protects the muscles and blood vessels of the hand. Bends the hand.

Flexor carpi radialis.—Long and thin; arises by a short split tendon, from the internal condyle of the humerus; proceeds fleshy along the middle of the fore-arm in the course of the radius. Its thin tendon passes under the annular ligament in a groove peculiar to itself, to be inserted into the metacarpal bone of the fore finger. Bends the wrist.

Pronator radii teres.—Small and round; arises from the internal condyle of the humerus, and from the coronoid process of the ulna. Fleshy, and of a conical shape; stretches obliquely across the arm to be inserted into the outer ridge of the radius, about the middle of its length. Turns the hand downwards.

Supinator radii brevis.—Short, thick, and fleshy, arises from the external condyle of the os brachii, from the edge of the ulna, and from the interosseous ligament; is turned over the radius to be inserted into its ridge. Rotates the radius outwards.

Extensor ossis metacarpi pollicis manus.—Extensor primus pollicis. Extensor primi internodii. Abductor longus pollicis manus.—Crosses the fore edge of the radius, arises from the edge of the ulna, about the middle of the arm. Divides into two, three, or four slips, with distinct tendons, which go under the ligament of the carpus to be

inserted into the root of the first metacarpal bone of the thumb Use to extend the thumb

Extensor primi internodii —Extensor minor pollicis manus Extensor pollicis primus Extensor secundi internodii Extensor secundus pollicis —Lies close to the former, arises just below it and accompanies it under the ligament of the wrist, passes on to be inserted into the first phalanx of the thumb, which it extends

Extensor secundi internodii —Extensor major pollicis manus Extensor pollicis secundus Extensor tertii internodii Extensor tertius pollicis —Thick and fleshy arises higher than the former on the ulna, and passes straight down that bone Its tendon passes the ligament of the wrist in a peculiar ring, and proceeds to be inserted into the last bone of the thumb which it extends

Indicator —Extensor indicis proprius Arises from the ridge of the ulna, is attached to the interosseous ligament its tendon passes under the annular ligament, and joins with the indicator tendon of the common extensor Extends all the three joints of the fore finger

Flexor digitorum sublimis —Perforatus —Large and fleshy, lies between the palmaris longus and flexor ulnaris, arises from the internal condyle of the os brachii, from the ligament of the elbow joint the coronoid process of the ulna, and from the upper part of the radius Divides about the middle of the fore arm into four fleshy slips, each of which gives off a slender tendon, which passes under the annular ligament, to be inserted, after being perforated near the first phalanx of the fingers by the tendons of the flexor digitorum profundus, into the fore part of the second phalanx Use, to bend the first and second phalanges

Flexor digitorum profundus —Perforans —Lies deeper than the former which it accompanies s from the internal surface of the ulna and interosseous ligament, divides into four slips, se tendons pass under the annular ligament, rforate those of the flexor sublimis, and are inserted into the fore part of the last phalanx of the fingers Bends the last joint of the fingers

Flexor longus pollicis —Runs by the inside of the radius arising from it, and the interosseous ligament, occasionally by another head from the condyle of the humerus and fore part of the ulna Passes under the annular ligament, and is inserted into the last bone of the thumb Bends the thumb

Pronator radii quadratus —Lies flat upon the interosseous ligament in the fore part of the arm, about two inches above the wrist Nearly square, its fibres go across between the radius and ulna Turns the radius upon the ulna

Muscles situated chiefly on the Hand

Lumbricales —Musculi fidicinales —Four small round muscles, resembling earth worms Arise in the palm of the hand, from the tendons of the profundus their small tendons reach the middle of the second phalanx Chiefly useful in performing the quick short motions of the fingers on musical instruments, &c

Flexor brevis pollicis manus —Two-headed on the inside of the thumb, one head arises from the os trapezium, the other from the os magnum Inserted into the sesamoid bones and edge of the first bone of the thumb Use, to bend the first joint of the thumb.

Opponens pollicis —Lies under the abductor pollicis, arising from the os scaphoides and ligament of the wrist is inserted into the fore part of the metacarpal bone of the thumb Bends the thumb, as in clenching the fist

Abductor pollicis manus —Lies immediately under the common integuments arises from the annular ligament of the wrist and the os scaphoides, bends gradually round the thumb to be inserted into the first bone of the thumb A second muscle is described, by Albinus, by the same name Pulls the thumb from the fingers

Adductor pollicis manus —The metacarpal bone of the middle finger gives origin to this triangular muscle, goes directly across to meet the thumb, and is inserted into the root of the first phalanx Draws the thumb towards the fore finger

Abductor indicis manus Flat and broad arises from the os trapezium and the first bone of the thumb and is inserted into the back part of the first bone of the finger, which it pulls forwards towards the thumb

Palmaris brevis —Palmaris cutaneus arises from the palmar aponeurosis and stretches across the hand to be inserted into the metacarpal bone of the little finger, and the superincumbent fat Stretches the aponeurosis of the palm of the hand

Abductor minimi digiti manus —Thin and fleshy, the hand rests upon it in writing arises from the os pisiforme and the outer end of the annular ligament and is inserted laterally into the first bone of the little finger Draws the little finger away from the rest

Adductor minimi digiti —Arises from the ligament of the wrist and cuneiform bone, and turns round the metacarpal bone of the little finger to be inserted into the outside of it Pulls the metacarpal bone of the little finger towards the thumb

Flexor parvus minimi digiti —Arises from the ligament of the wrist and cuneiform bone, and accompanies the abductor minimi digiti and has nearly the same insertion Bends the little finger

Interossei externi et interni —Small muscles lying between the metacarpal bones and assisting the lumbricales in bending the fingers

Muscles of the inferior extremities

Pectinalis —Pectinæus —Flat and square, lies under the skin, and arises from the os pubis, or pectinis, as it forms the brim of the pelvis, immediately above the foramen thyroideum, proceeds downwards to be inserted by a long flat tendon into the linea aspera of the thigh bone just below the little trochanter Use, to bring the knees together, to raise the thigh upwards, and give it a degree of rotation outwards

Triceps adductor femoris —Broad, flat, and tricapitate, usually described as three muscles, under the names of adductor longus, adductor brevis, adductor magnus

The use of all these is to bring the thigh forwards and upwards

Obturator externus —So named from its origin Arises from the obturator ligament, and from the ramus ischii and pubis, forming the sides of the thyroid foramen Its fleshy fibres are soon gathered into a round tendon, which twists under the os femoris to be inserted into the cavity at the root of the great trochanter Use, to roll the thigh obliquely outwards

Gluteus maximus —Gluteus magnus Gluteus major —Lies immediately under the skin, upon the posterior part of the thigh, upon which we sit, arises fleshy from the posterior half of the

spine of the ilium, from the junction of the ilium and sacrum from the whole external surface of the sacrum, and from the sacro-sciatic ligament The fibres run obliquely forwards and downwards to the thigh-bone, are gathered into a broad tendon, and implanted into the great trochanter, and about three inches along the linea aspera Extends the thigh, by pulling it directly backward and a little outwards

Gluteus medius —Lies immediately under the former arises from the anterior half of the spine of the ilium and from its anterior superior spinous process Its fibres converge towards the great trochanter into which the muscle is inserted by a broad tendon Use to draw the thigh outwards and a little backwards, and to roll the thigh outward, especially when it is bended

Gluteus minimus —Gluteus minor —Arises from the middle of the external surface of the ilium from a ridge continued from the superior anterior spinous process tendon inserted into the fore and upper part of the great trochanter To assist the other glutei muscles

Pyriformis —Iliacus externus Pyramidalis.— Named from its shape arises by three fleshy and tendinous beginnings from the hollow of the sacrum and sacro sciatic notch, and growing gradually narrower, passes between the gluteus minor and gemini its round tendon inserted into the upper part of the cavity, at the inner side of the root of the great trochanter Use to move the thigh upwards and roll it outwards.

Gemini —Gemelli —Bicapitate, and often taken for two muscles The uppermost, or the larger and stronger head, arises from the spinous process of the ischium the smaller head from the outer end of the tuberosity of the ischium Both fleshy in their whole length, and, meeting, form a tendon to be inserted into the root of the great trochanter Rolls the thigh-bone outwards

Quadratus femoris —Passes in a transverse direction between the tuberosity of the ischium and the thigh bone Arises from the outside of the tuberosity of the ischium, and is inserted into the ridge between the large and little trochanters Rolls the thigh outwards.

Muscles situated on the thigh.

Tensor-vaginæ femoris —Fascialis. Musculus aponeurosis, vel fasciæ latæ.—Arises from the anterior superior spinous process of the ilium by a narrow tendinous and fleshy slip; whence it proceeds to be inserted into the inside of the fascia of the thigh, which it stretches

Sartorius —Extends long and obliquely across the whole thigh Arises tendinous from the anterior superior spinous process of the ilium, then [illegible] flat belly, somewhat like a strap, [illegible] round the thigh to be inserted [illegible] the head of the tibia by a [illegible] in bending the leg obliquely inwards, and in bringing one leg across the other, an action common to tailors, whence its name, which signifies the tailor's muscle

Gracilis —Gracilis internus Rectus internus femoris —Small, thin, and flat, arises tendinous from the pubis, near its symphysis, and passes directly under the integuments down to the knee, to be inserted under the sartorius into the side of the head of the tibia. Assists the sartorius in bending the leg

Rectus femoris —Rectus cruris. Rectus sive gracilis anterior —Arises from the inferior anterior spinous process of the ilium by a short round tendon, and from the edge of the acetabulum and capsular ligament forms a flat tendon, which soon becomes fleshy, and passes directly down towards the patella Is united at the sides to the vasti, at the back part to the cruræus Its tendon, with that of the cruræus, is implanted into the patella Assists in extending the leg, in a very powerful manner

Vastus externus —Arises by a thick and strong tendon from the root of the great trochanter and upper part of the linea aspera, passes down the thigh, attached to the cruræus, and forms a flat tendon, which embraces the patella, and goes round the head of the tibia to be inserted into the inner side of the knee. Extends the leg

Vastus internus —Resembles the former but not so large Arises tendinous and fleshy from the fore part of the little trochanter, and from the whole of the linea aspera runs obliquely forwards and downwards, accompanying the cruræus, its tendon surrounding the knee-pan to be inserted into the outer part of the head of the tibia Assists the externus in extending the leg

Cruræus —Cruralis —Rises from the little trochanter, and nearly the whole of the forepart of the os femoris. On its outer edge and fore part united to the vastus externus; on its inner edge and fore part to the vastus internus At its lower part is joined to the tendon of the rectus, and forms one tendon, inserted into the patella

Subcruræi Two little muscular slips sometimes found under the cruræus, they are inserted into the capsular ligament which they pull up The cruræus assists in extending the leg

Semitendinosus —Seminervosus —Arises tendinous and fleshy from the posterior portion of the tuberosity of the ischium, and continues a little way connected with the biceps cruris, then leaves it, and goes obliquely inwards to form a long tendon, which passes down behind the inner tubercle of the knee to be inserted into the inside of the tibia, a little below its tuberosity Use, to bend the leg backwards and a little inwards

Semimembranosus —Begins and ends by a flat tendon, somewhat like a membrane arises by a broad, thin, flat tendon from the fore part of the tuberosity of the ischium and terminates in a short tendon, inserted behind the head of the tibia, with the tendon of the semitendinosus, forms the inner ham-string Use, to bend the leg, and bring it directly backwards

Biceps flexor cruris —Biceps cruris Biceps — So named from its two heads; lies immediately under the skin in the back part of the leg arises tendinous from the outer part of the tuberosity of the ischium, with the semitendinosus The short head begins from the linea aspera, and continues down to its bifurcation A little above the condyle of the femur the two heads unite, and proceed to be inserted into the head of the fibula, forming the outer ham-string use to bend the leg

Popliteus —Small and triangular, lying across the back part of the knee-joint. Arises from the outer condyle of the femur, and inserted into a ridge on the back part of the tibia. Assists in bending the leg, and prevents the capsular ligament from being pinched

Muscles situated on the leg

Gastrocnemius externus.—Gemellus.—Large, fleshy, and forms the calf of the leg. Arises by two heads from the external and internal condyle of the femur the two heads meet, and run down the calf with the appearance of a raphe between;

they then form a flat tendon, very broad at its commencement, which passes down the leg, and unites with the tendon of the gastrocnemius internus a little above the ankle

Gastrocnemius internus.—Soleus Extensor tarsi suralis.—Arises, like the former, by two heads the one from the back part of the head of the fibula, the other from the posterior and upper part of the tibia these immediately unite, and form a large fleshy belly About half way down the leg it becomes tendinous, and soon unites with the tendon of the gastrocnemius externus From this union is produced the tendo Achillis, which inserts both muscles into the extremity of the os calcis

Plantaris.—Tibialis gracilis, vulgo plantaris Extensor tarsi minor, vulgo plantaris.—Long and slender, arises fleshy from the external condyle of the femur, and adheres firmly to the capsular ligament of the knee forms a small flat tendon, which runs between the inner head of the external gastrocnemius, and the soleus, to be attached to the tendo Achillis, with which it is inserted into the inner side of the os calcis Use, to prevent the capsular ligament of the knee-joint from being pinched, and to assist the gastrocnemii muscles

Tibialis anticus.—Arises from the fore part and outside of the tibia, just under the head of that bone About two thirds down the bone it becomes tendon, which passes obliquely over the leg, crosses the ankle, and goes under the annular ligament to be inserted into the upper and inner part of the os cuneiforme internum, and metatarsal bone of the great toe Extends the foot, and turns the toes inwards

Tibialis posticus.—Arises from the back part and ridge of the tibia, from the opposite part of the fibula, and from the interosseous ligament quite down to the ankle About the middle of the tibia becomes tendinous and fleshy, passes in a groove at the inner ankle, and expands so as to grasp the bones of the tarsus, is inserted into the two first metatarsal bones, os calcis, and os cuboides Its contraction pulls the foot in, so as to put the toes together

Peroneus longus.—Peroneus maximus, vulgo peroneus posterior Peroneus primus, seu posticus.—Arises from the fore part of the head of the fibula, and has a small slip from the upper part of the tibia About the middle of the leg its tendon emerges towards the integuments, and passing the outer ankle in a cartilaginous pulley which also transmits the peroneus brevis, is reflected to the sinuosity of the os calcis, and runs along a groove in the os cuboides to be inserted tendinous into the outside of the root of the metatarsal bone of the great toe, and the os cuneiforme internum Moves the foot outwards, and assists in extending it.

Peroneus brevis.—Peroneus medius, vulgo peroneus anticus Peroneus secundus, seu anticus Arises fleshy from above the middle of the external part of the fibula, all the way down to the ankle, adheres also to the tendinous partition between it and the common extensors Its tendon passes under that of the peroneus longus, by the outer ankle, to be inserted into the metatarsal bone of the little toe Assists the former in pulling the foot outwards and extending it

Extensor longus digitorum pedis.—Extensor longus. Peroneus tertius Nonus Vesalii.—A common extensor of the toes Arises from the outer and fore part of the head of the tibia, just below the knee; from the head of the fibula, the interosseous ligament, and the tendinous fascia of the leg. Becomes a thick fleshy muscle, and is divided into three distinct portions, which form three round tendons that pass obliquely inwards under the annular ligament of the tarsus where the first portion divides its tendon into two These four tendons are inserted flat into the root of the first joint of each of the four small toes, expanding along the upper side as far as the root of the last joint A portion of this muscle also arises from the middle of the fibula, and sends its fleshy fibres forwards to a tendon which goes under the annular ligament to be inserted into the root of the metatarsal bone of the little toe This portion is termed, by Albinus peroneus tertius

Extensor proprius pollicis pedis.—Extensor longus.—An extensor of the great toe Arises by an acute, tendinous, and fleshy beginning, from the head of the fibula continues slender down the fibula, and its tendon passes under the annular ligament to be inserted into the posterior part of the last and first joint of the great toe

Flexor longus digitorum pedis.—Profundus Perforans.—Arises from nearly the whole of the back part of the tibia Near the ankle becomes tendinous, crosses the tendon of the tibialis posticus behind the ankle joint, goes forward in a groove of the os calcis, and about the middle of the sole of the foot divides into four tendons which pass *through the slits of the perforatus to be inserted into the extremity of the last joint of the four* lesser toes. Just before the division of the tendon, it receives a considerable tendon from that of the flexor pollicis longus The use of the perforans is to bend the last joint of the toes

Flexor digitorum accessorius.—Massa carnea Jacobi Sylvii.—A small fleshy mass connected with the former, whose office it assists Arises from the lower part of the os calcis, and is inserted into the flexor longus digitorum pedis at its division into four tendons.

Flexor longus pollicis pedis.—A flexor of the great toe, arising fleshy from the upper part of the fibula, and continued down the same bone almost to the ankle by a double order of oblique fleshy fibres Its tendon passes under the annular ligament to be inserted into the last joint of the great toe

Muscles chiefly situated on the Foot

Extensor brevis digitorum pedis.—Extensor brevis.—A common extensor of the toes, very closely connected with the extensor longus digitorum pedis Arises fleshy and tendinous from the fore part of the os calcis, and, passing forwards soon divides into distinct muscular heads, from each of which a tendon is sent off to be inserted into the great toe, and the three next to it, with the extensor longus

Flexor brevis digitorum pedis.—Perforatus Sublimis.—Placed on the sole of the foot arises from the inferior and posterior part of the os calcis, soon becomes a fleshy belly, and divides into four tendons, which are split about the root of the first bone of the toes for the passage of the tendons of the flexor longus digitorum pedis Its tendons are inserted into the second phalanx of the four lesser toes, which they bend

Lumbricales pedis.—These four small muscles resemble the earth-worm, or lumbricus. Arise from the forks of the tendons of the flexor profundus, and pass on to be inserted by slender tendons into the inside of the first joint of the four lesser toes. Use, to bend the first joint of the toes, and to draw them towards the great toe

Flexor brevis pollicis pedis.—Arises by a long tendon from the under and fore part of the os cal-

cis and from the os cuneiforme externum, divides into two heads one of which goes to the abductor, and the other to the adductor pollicis, and is inserted with the tendons of those muscles into the external sesamoid bone and root of the first joint of the great toe, which it bends

Abductor pollicis pedis —Thenar —Arises by short tendinous fibres from the inner and lower part of the os calcis, and is inserted tendinous into the internal sesamoid bone and root of the first joint of the great toe Use, to pull the great toe from the rest

Adductor pollicis pedis —Antithenar —Arises by a long delicate tendon from the ligament extending from the os calcis to the os cuboides, soon divides into two fleshy heads, which again unite and go obliquely inwards to be inserted into the sesamoid bone, or first bone of the great toe Use, to bring this toe nearer to the rest

Abductor minimi digiti pedis —Arises from the tuberosity of the os calci forms two small tendons, the shorter one inserted into the root of the metatarsal bone of the little toe, and the longer goes on to be fixed into the root of the first bone of that toe Use, to bend the little toe and carry it somewhat outwards, and to support the tarsus in walking

Flexor brevis minimi digiti pedis —Parathenar minor Arise from the metatarsal bone of the little toe, which it goes over to be inserted into the root of the first bone of the little toe Use, to bend this toe

Transversalis pedis —Extends transversely across the sole of the foot, arising from the ligament which connects the bones of the tarsus going across to be inserted into the tendon of the adductor pollicis Contracts the foot

Interossei externi et interni —Four small double headed muscles situated externally, and four internally, all arising from the metatarsal bones they lie between Their tendons meet those of the long and short extensors, forming all together the sheath which covers the upper part of the toes

The muscles situated on the sole of the foot are covered by a strong flat tendon, called the plantar aponeurosis, extended from the os calcis to the first joint of all the toes, protecting the muscles, blood vessels, and nerves running under it

ANGIOLOGY, OR DOCTRINE OF THE VESSELS

Vessels are long membranous canals, which carry blood, lymph, chyle, or a secreted fluid, and are hence divisible into arteries, veins, absorbents, and secernents

Arterial System

Arteries are elastic membranous canals, which alternately dilate and contract They progressively grow narrower as they proceed from the heart towards the extremities They originate from the ventricles of the heart, viz the pulmonary artery from the right, and the aorta from the left ventricle so that there are only two arteries in strictness of language, the rest being branches of these two They terminate in veins, or exhaling vessels or anastomose with one another. They are composed of three membranes, called coats; an external, which is elastic; a middle, which is muscular, and an inner, which is smooth, and serves according to the other two.

They convey blood from the heart to the different parts of the body, for nutrition, preservation of life, generation of heat and the secretion of different fluids

The aorta arises from the left ventricle of the heart, forms an arch towards the dorsal vertebræ, then descends through the diaphragm into the abdomen in which it proceeds by the left side of the spine to the last vertebra of the loins, where it divides into the two iliac arteries In this course it gives off, just above its origin, two coronary arteries to the heart, and then forms an arch which gives off three other branches which supply the head, neck, and arms with blood, these are,

I Arteria innominata, which divides into the right carotid and right subclavian arteries

II The left carotid

III The left subclavian

The carotid arteries, having emerged from the chest, run up along the neck, one on each side of the trachea, to the angle of the lower jaw, where they divide into external and internal

The external carotid gives off eight branches to the neck and face

1 Arteria thyroidea, which is very tortuous, supplies the thyroid gland and gives off branches to several adjacent muscles

2 A lingualis, which lies flat upon the side of the tongue, and gives off the ramus hyoideus, dorsalis linguæ, sublingualis, and ranina

3 A labialis, called also the external maxillary, the angular and facial artery it gives off the palatina inferior, the submentalis, and the coronary of the lips

4 A pharyngea inferior which sends a number of small twigs about the fauces and basis of the cranium

5 A occipitalis, from which the posterior temporal arises

6 A posterior auris, which furnishes the parts about the cartilages of the ear with blood and transmits the arteria tympani and stylo mastoidea

7 A maxillaris interna, which is extremely tortuous, and gives off—the spinous artery to the dura mater, the lower maxillary artery, which is included in the lower jaw and supplies the teeth and face, the pterygoid arteries which nourish the pterygoid muscles, two deep temporal arteries, which lie wider than the temporal muscle The internal maxillary then gives off a branch, which almost immediately divides into the alveolar and infra-orbital, then an artery to the palate, the superior palatine, the upper pharyngeal, which plays about the sphænoid sinus, and lastly, the nasal artery, which is transmitted through the sphæno-palatine foramen to the cavity of the nostrils

8 A temporalis which perforates the parotid gland, and sends off the transversalis faciei, which inosculates with the arteries of the face, and several branches which go to the ear, forehead, and about the temples

The internal carotid, or cerebral, leaves the external at the angle of the jaw, and proceeds by the par vagum and intercostal nerve to the carotid canal in the petrous portion of the temporal bone, where it is shaped like the letter S, and enters the cranium at the side of the sella turcica, having given off two very small twigs to the pituitary gland, and 3d, 4th, and 5th pair of nerves, and when it has reached the anterior clinoid process, it sends off—

1 Arteria ophthalmica, which is distributed on the eye.

2 A anterior cerebri, which proceeds before

the sella turcica, unites with its fellow, and forms the circle of Willis, from which a branch proceeds to the third ventricle, septum lucidum, and the arteria corporis callosi

3 A media cerebri, which runs between the anterior and middle lobes of the brain gives off the artery of the choroid plexus, and is lost on the middle lobe of the brain

4 A communicans which proceeds backwards, and soon inosculates with the vertebral

The subclavian artery arises on the right side, from the arteria innominata, and on the left from the arch of the aorta

Each subclavian gives off five branches

1 The internal mammary, from which arise the A thymica A comes phrenici, the pericardiac, and the phrenico pericardiac

2 The inferior thyroid, from which arise the ramus thyroideus the tracheal arteries, the ascending thyroid, and the transversalis humeri

3 A vertebralis, which proceeds into the vertebral foramina, to ascend into the cavity of the cranium where it unites upon the cuneiform process of the occipital bone with its fellow of the other side, and forms the basilary artery, which immediately gives off the posterior artery of the cerebellum, it then proceeds upon the tuberculum annulare, to give off four branches, two to the right and two to the left, which constitute the A anterior cerebelli, which branch to the crura cerebelli, the cerebellum, vermis, crura cerebri, corpora quadrigemina, pineal gland, and fourth ventricle, and the A posterior cerebri which being joined by the communicans supplies the thalami nervorum opticorum the centrum geminum, semicirculare infundibulum, and crura fornicis, and the posterior lobes of the brain, inosculating with several arteries

4 A cervicalis profunda

5 A cervicalis superficialis, both of which are distributed about the muscles of the neck

6 A intercostalis superior, which lies between the two upper rib

7 A supra scapularis, which sometimes arises from the A thyroidea, when it is called the transversalis humeri

As soon as the subclavian has arrived in the axilla, it is called the axillary artery, and this again, when it runs into the arm, is termed the brachial

The axillary artery gives off—

1 The four mammary arteries, called thoracica superior, thoracica longior, thoracica humeraria, and thoracica alaris or axillaris, which supply blood to the muscles about the breast

2 The subscapularis, which supplies the lower surface of the scapula

3 The circumflexa posterior

4 Circumflexus anterior, which ramify about the joint

The brachial or humeral artery gives off—

1 Many lateral vessels

2 A profunda humeri superior

3 A profunda humeri inferior

4 Ramus anastomoticus magnus, which anastomoses round the elbow joint

The brachial artery then becomes the ulnar, and gives off the radial

The ulnar or cubital artery sends off—

1 The recurrent branches, which anastomose with the ramus anastomoticus magnus

2 A interossea communis It then sends small branches to the adjacent muscles, as it proceeds down to the wrist, just before it arrives here, it gives off A dorsalis ulnaris, which goes round to the back of the little finger At the wrist it gives off A palmaris profunda, then forms a great arterial arch, called the superficial palmar arch, which supplies branches to the fingers

The radial gives off the radial recurrent, proceeds to the wrist, where the pulse is felt, and gives off the superficialis volæ, and afterwards divides into the A dorsalis pollicis A radialis indicis, A magna pollicis, and A palmaris profunda

The descending aorta gives off, in the breast—

1 The bronchial arteries, which nourish the lungs

2 The œsophagic, which go to the œsophagus

3 The intercostal, between the ribs

4 The inferior diaphragmatic

Within the abdomen it gives off eight branches—

1 The cœliac which divides into three branches

i Arteria hepatica, which gives off—

a A duodeno-gastrica, which ends off the right gastro epiploic and the pancreatico duodenalis The latter transmits the pilorica inferior and the transverse pancreatic

b A pilorica superior hepatica

The hepatic artery then ramifies through the liver

ii A coronaria ventriculi or gastrica which gives off the superior coronary and superior piloric arteries

iii A splenica, from which arise the pancreatica magna and pancreaticæ parvæ the posterior gastric arteries, the left gastro-epiploic artery, and the vasa brevia

2 The superior mesenteric, or meseraic, of which the colica media colica dextra and the ileo colica are branches

3 The renal arteries, or emulgents which are short, and divide into three or four branches in the pelvis of the kidney

4 The spermatic arteries, which are very small and long, and proceed with the spermatic cord to the testicles

5 The inferior meseraic, from which arises the left colic artery and the internal hæmorrhoidal

6 The lumbar arteries, which nourish the muscles and vertebræ of the loins

7 The middle sacral artery, which is distributed about the sacrum

The aorta then bifurcates, and becomes the iliac arteries

The iliac soon divides into internal and external

Each internal iliac, or hypogastric artery gives off five branches

1 The lateral sacral arteries, three or four in number

2 The gluteal, which ramify upon the back of the iliac portion of the os innominatum, and supply the gluteal muscles

3 The ischiatic, which turns downwards along the hip, and gives off the coccygeal artery

4 Arteria pudica communis, which is sometimes a branch of the sciatic artery, it proceeds out of the pelvis, through the sciatic notch, returns into the pelvis, and runs towards the symphysis of the pubes In this course it gives off branches to the vesiculæ seminales and prostate gland, and the lower or external hæmorrhoidal artery to the anus, and then forms the arteria

perinei the arteria penis, which proceed one on each side, and a branch which plunges deep into the substance of the penis

5 The obturatory, which passes through the oval foramen and is distributed on the thick muscles in the centre of the thigh

Each external iliac gives off—

1 The epigastric, which is reflected from Poupart's ligament upwards along the abdomen

2 Arteria circumflexa ilii a which run backwards along the crista ilii

The external iliac then passes under Poupart's ligament become the femoral or crural artery and is continued along the thigh into the popliteal In this course it gives off, near the groin—

1 The profunda femoris, which gives off the arteria perforans prima, the arteria perforans secunda media, the arteria perforans tertia the arteria perforans quarta, which nourish the muscles of the thigh The femoral artery then makes a spiral turn round the os femoris and sends off small branches of no importance to adjacent muscles About two hands, breadth from the knee it gives out—

2 The ramus anastomoticus magnus, which ramifies about the knee joint

The femoral artery, having reached the ham, is called the popliteal, which gives off several small branches about the joint, and divides below the ham into the tibialis antica and tibialis postica

The tibialis antica soon perforates the interosseous ligament passes along the tibia over the bones of the tarsus and then inosculates with the back arteries In this course it gives off—

1 The recurrent, which inosculates with the anterior branches of the popliteal, it then sends off small branches to neighbouring muscles as it passes down the leg

2 Arteria malleolaris interna, about the inner ankle

3 Arteria malleolaris externa, about the outer ankle

4 Arteria tarsea, which lies upon the bones of the tarsus

5 Arteria metatarsea, to the tendons of the peronei muscles

6 Dorsalis externa hallucis, which runs along the metatarsal bone of the great toe.

The tibialis postica passes along the back part of the tibia, goes round the inner ankle, and divides at the heel into the two plantar arteries In this course it sends off—

1 Arteria nutritia tibiae, which gives branches to the popliteus, soleus, and tibialis anticus muscles, before it enters the bone

2. Many small branches, as it passes downwards

3. Arteria plantaris interna, which runs along the inner edge of the sole of the foot, and sends off four branches about the foot

4 Arteria plantaris interna, which forms an arch and inosculates with the anterior tibial artery, and gives off the digital branches to the toes

The pulmonary artery arises from the right ventricle of the heart, and conveys the dark coloured blood into the lungs, which is returned to the heart, of a florid colour, by the veins It soon divides into a right and left; the right going to the right lung, and the left to the left lung, where each divides into innumerable ramifications, and forms a beautiful net-work, or plexus of vessels, upon the air vesicles, and then terminates in the pulmonary veins, which convey the blood, now become florid, to the left side of the heart.

Venous System

Veins are membranous canals which do not pulsate, and of the cause of whose action we are ignorant They gradually become larger as they advance towards the heart in which they terminate, and bring back the blood from the arteries They originate from the extremities of all the arteries that do not terminate with exhalant orifices

They progressively anastomose in their course towards the heart, and at length terminate in its auricles

They run by the sides of arteries, but more superficially, and are divided into branchlets, branches, and trunks.

Like arteries, they are composed of three membranes, but they are semi-transparent, and more delicate

They are armed with valves, which are thin semilunar membranous folds, found in most veins, and placed there to prevent the blood from being pressed backwards out of its natural course

The blood is returned from every part of the body into the right auricle —the vena cava superior receives it from the head, neck, thorax, and superior extremities, the vena cava inferior, from the abdomen and inferior extremities, and the coronary vein receives it from the coronary arteries of the heart

The vena cava superior terminates in the superior part of the right auricle, into which it evacuates the blood from the right and left subclavian veins, and the vena azygos

The right and left subclavian veins receive the blood from the head and upper extremities, in the following manner

The veins of the fingers, called digitals, receive their blood from the digital arteries, and empty it into—

1 The cephalic of the thumb, which runs on the back of the hand along the thumb, and evacuates itself into the external radial

2 The salvatella, which runs along the little finger, unites with the former, and empties its blood into the internal and external cubital veins At the bend of the fore arm are three veins, called the great cephalic, the basilic, and the median

The great cephalic runs along the superior part of the fore-arm, and receives the blood from the external radial.

The basilic ascends on the under side, and receives the blood from the external and internal cubital veins, and some branches which accompany the brachial artery, called venæ satellitum

The median is situated in the middle of the fore-arm, and arises from the union of several branches

These three veins all unite above the bend of the arm, and form—

The brachial vein, which receives all their blood, and is continued into the axilla, where it is called

The axillary vein This receives also the blood from the scapula, and superior and inferior parts of the chest, by the superior and inferior thoracic vein, the vena muscularis, and the scapularis

The axillary vein then passes under the clavicle, where it is called the subclavian, which unites with the external and internal jugular veins, and the vertebral vein which brings the blood from the vertebral sinuses, it receives also the blood from the mediastinal, pericardiac, diaphragmatic, thymic, internal mammary, and la-

ryngeal veins, and then unites with its fellow, to form the vena cava superior, or, as it is sometimes called, vena cava descendens

The blood from the external and internal parts of the head and face is returned in the following manner into the external and internal jugulars, which terminate in the subclavians

The frontal, angular, temporal, auricular, sublingual, and occipital veins receive the blood from the parts after which they are named, these all converge to each side of the neck, and form a trunk called the external jugular vein

The blood from the brain, cerebellum, medulla oblongata, and membranes of these parts, is received into the lateral sinuses, or veins of the dura mater, one of which empties its blood through the foramen lacerum in basi cranii into the internal jugular, which descends in the neck by the carotid arteries, receives the blood from the thyroidea and internal maxillary veins, and empties itself into the subclavians within the thorax

The vena azygos receives the blood from the bronchial, superior œsophageal, vertebral, and intercostal veins, and empties it into the superior cava

The vena cava inferior is the trunk of all the abdominal veins and those of the lower extremities, from which parts the blood is returned in the following manner

The veins of the toes, called the digital veins, receive the blood from the digital arteries, and form on the back of the foot three branches one on the great toe called the cephalic, another, which runs along the little toe, called the vena saphena, and one on the back of the foot, vena dorsalis pedis, and on the sole of the foot they evacuate themselves into the plantar veins

The three veins in the upper part of the foot coming together above the ankle, form the anterior tibial, and the plantar veins, with a branch from the calf of the leg, called the sural vein, form the posterior tibial a branch also ascends in the direction of the fibula, called the peroneal vein These three branches unite before the ham, into one branch, the subpopliteal vein, which ascends through the ham, carrying all the blood from the foot, it then proceeds upon the anterior part of the thigh where it is termed the crural or femoral vein, receives several muscular branches, and passes under Poupart's ligament into the cavity of the pelvis, where it is called the external iliac

The arteries which are distributed about the pelvis evacuate their blood into the external hæmorrhoidal veins, the hypogastric veins, the internal pudendal, the vena magna penis, and obturatory veins, all of which unite in the pelvis, and form the internal iliac vein

The external iliac vein receives the blood from the external pudendal veins, and then unites with the internal iliac at the last vertebra of the loins, and forms the vena cava inferior, or ascendens, which ascends on the right side of the spine, receiving the blood from the sacral, lumbar, right spermatic veins, and the vena cava hepatica, and, having arrived at the diaphragm passes through the right foramen, and enters the right auricle of the heart, into which it evacuates all the blood from the abdominal viscera and lower extremities.

The venæ cavæ hepaticæ ramify in the substance of the liver, and bring the blood into the vena cava inferior from the branches of the vena portæ.

The vena portæ carries the blood from the abdominal viscera into the substance of the liver The trunk of this vein, about the fissure of the liver, in which it is situated, is divided into the hepatic and abdominal portions The abdominal portion is composed of the splenic, mesenteric and internal hæmorrhoidal veins These three venous branches carry all the blood from the stomach, spleen, pancreas omentum, mesentery, gall-bladder, and the small and large intestines into the sinus of the vena portæ The hepatic portion of the vena portæ enters the substance of the liver divides into innumerable ramifications which secrete the bile, and the superfluous blood passes into corresponding branches of the venæ cavæ hepaticæ

Absorbent System

Absorbents are very thin and pellucid vessels, which imbibe and carry the lymph from every part of the body, as they do also substances applied to the surface of the body, and the chyle from the intestines, into the thoracic duct They are divided into lacteals and lymphatics They are called lacteals in the intestines and mesentery, and lymphatics in every other part Like the veins, they anastomose and become broader as they proceed towards their termination Their valves are more numerous, and give them a knotted appearance They are supposed to exist in every part of the body, although they have not been as yet detected in some, as the brain, &c They originate from the cellular membrane the viscera, the excretory ducts of the viscera, the external surface, and every part of the body, and terminate in the thoracic duct or subclavian vein They become frequently implicated, and form lymphatic or conglobate glands which are situated every where in the course of the lymphatics Their structure consists of tender, pellucid, strong tunics The use of the absorbents is to carry back the lymph from different parts into the blood, to convey the chyle from the intestines to the thoracic duct, where it is mixed and diluted by the lymph, and to absorb substances from surfaces and parts on which they originate We are as ignorant of the cause of the projectile power of the absorbents as we are of that of the veins

The lacteal absorbents, forming a part of the mesentery, are considered in the division of Splanchnology

The lymphatic absorbents exist in every the minutest part of our body this is proved by experiment, though their existence cannot be demonstrated to the eye They are divided into those of the head and neck, upper and lower extremities, and those of the viscera.

Lymphatics of the head and neck—The absorbents on the scalp and about the viscera of the neck, unite into a considerable branch that accompanies the jugular vein Absorbents have not been detected in the human brain yet there can be no doubt of there being such vessels It is probable that they pass out of the cranium through the canalis caroticus and foramen lacerum in basi cranii, on each side, and join the above jugular branch, which passes through some glands as it proceeds into the chest to the angle of the subclavian and jugular vein

The absorbents of the upper extremities are divided into superficial and deep-seated The superficial ascend under the skin in every direc

tion to the wrist, whence a branch proceeds upon the posterior surface of the fore arm to the head of the radius, over the internal condyle of the humerus, up to the axilla, receiving several branchlets in its course. Another branch proceeds from the wrist along the anterior part of the fore-arm and forms a net-work with a branch coming over the ulna from the posterior part, and ascends on the inside of the humerus to the glands of the axilla.

The deep-seated absorbents accompany the larger blood vessels and pass through two glands about the middle of the humerus, and ascend to the glands of the axilla. The superficial and deep seated absorbents having passed through the axillary glands, form two trunks, which unite into one to be inserted with the jugular absorbents into the thoracic duct at the angle formed by the union of the subclavian with the jugular vein.

The absorbents of the inferior extremities are also superficial and deep seated. The superficial lie between the skin and muscles. Those of the toes and foot form a branch which ascends upon the back of the foot over the tendon of the cruraeus anticus, forms with other branches, a plexus above the ankles, then proceeds along the tibia over the knee, sometimes passes through a gland, and ascends the inside of the thigh to the subinguinal glands.

The deep-seated absorbents follow the course of the arteries and accompany the femoral artery, in which course they pass through some glands in the leg and above the knee and then proceed to some deep-seated subinguinal glands.

The absorbents from about the external parts of the pubis, as the penis, perinæum, and from the external parts of the pelvis in general proceed to the inguinal glands. The subinguinal and inguinal glands send forth several branches, which pass through the abdominal ring into the cavity of the abdomen.

The absorbents of the lower extremities accompany the external iliac artery, where they are joined by many branches from the uterus, urinary bladder, spermatic cord, and some branches accompanying the internal iliac artery; they then ascend to the sacrum, where they form a plexus, which proceeds over the psoas muscles, and meeting with the lacteals of the mesentery form the receptaculum chyli, which in adults, is about the size of a large pea, and is the commencement of the thoracic duct or trunk of the absorbents which is formed by the junction of the lymphatics of the lower extremities and the lacteals; it is of a serpentine figure, about the size of a crow-quill, and runs up the dorsal vertebræ through the posterior opening of the diaphragm between the aorta and vena azygos, to the angle formed by the union of the subclavian and jugular veins. In this course it receives—

1 The absorbents of the kidneys, which are both superficial and deep-seated, and unite as they proceed towards the thoracic duct.

2 The absorbents of the spleen, which are upon its peritoneal coat, and unite with those of the pancreas.

3 A branch from a plexus of vessels passing above and below the duodenum, and formed by the absorbents of the stomach, which come from the lesser and greater curvature, and are united about the pylorus with those of the pancreas and liver, which converge from the external surface and internal parts towards the porta of the liver, and also by several branches from the gall-bladder.

4 The absorbents of the diaphragm, pleura, lungs, heart, and pericardium.

Secernent System.

The capillary arteries which do not terminate in veins secrete, either by their own mouths, certain peculiar fluids, fitted to the organs to which they respectively appertain, or give birth to other vessels, which secrete them in their stead; but the minuteness of these capillary tubules prevents all decision upon this subject.

It is from these secerning vessels that the surface of every membrane and cavity of the body, whether external or internal, is sufficiently lubricated to fulfil its respective function.

The fluids which are thus discharged are of various kinds, mucous, sebaceous, or limpid, adapted to the uses of the organs to which they appertain. They are also secreted in various manners and quantities; sometimes by the medium of glands, sometimes without any such organization, and into distinct bags or pouches called bursæ. Whence the more important of the secernent organs may be divided into bursal and glandular.

Bursæ, or bursæ mucosæ, possessing this epithet from the peculiar nature of their content, are composed of a proper membrane, containing a kind of mucous fat, formed by the exhaling arteries of their internal surface. They are of different sizes and firmness, and connected here and there by cellular membrane with the capsular ligaments of cavities, tendons, bones or ligaments. Their internal surface is highly vascular, smooth and shining. They are divided into vaginal and vesicular, and their office is to lubricate the muscles and tendons which are very frequently in motion. They are variously situated. The following are the chief.

I About the head. 1 Bursa of the superior oblique muscle of the eye, situated behind its trochlea in the orbit.—2 Bursa of the digastricus, in the internal surface of its tendon.—3 Bursa of the circumflexus or tensor palati, between the hook-like process of the sphenoid bone and the tendon of that muscle.—4 Bursa of the sterno-hyoideus muscle, between the os hyoides and larynx.

II About the shoulder joint. 1 External acromial, under the acromion, between the coracoid process, deltoid muscle, and capsular ligament.—2 Internal acromial, above the tendon of the infra spinatus and teres major, often communicates with the former.—3 Coracoid bursa, near the root of the coracoid process; it is sometimes double, and sometimes triple.—4 Clavicular bursa, found where the clavicle touches the coracoid process.—5 Subclavian bursa, between the tendon of the subclavicularis muscle and the first rib.—6 Coraco brachial, between the common origin of this muscle, the biceps, and the capsular ligament.—7 Bursa of the pectoralis major, under the head of the humerus, between the internal surface of the tendon of that muscle, and another bursa placed on the long head of the biceps.—8 External bursa of the teres major, under the head of the os humeri, between it and the tendon of the teres major.—9 Internal bursa of the teres major, found within the muscle where the fibres of its tendon diverge.—10 Bursa of the latissimus dorsi, between the tendon of this muscle and the os humeri. 11 Humero-bicipital bursa, in the vagina of the

tendon of the biceps There are other bursae mucosae about the humerus, but their situation is uncertain

III Near the elbow joint 1 Radio-bicipital, between the tendon of the biceps brachialis, and anterior tubercle of the radius —2 Cubito-radial, between the tendon of the biceps, supinator brevis, and the ligament common to the radius and ulna —3 Anconeal bursa, between the olecranon and tendon of the anconeus muscle —4 Capitulo radial bursa, between the tendon common to the extensor carpi radialis brevis, and extensor communis digitorum and round head of the radius There are other bursae, but as their situation varies they are omitted

IV Of the inferior part of the fore-arm and hand On the inside of the wrist and hand — 1 Very large bursa, for the tendon of the flexor pollicis longus —2 Four short bursae on the fore part of the tendons of the flexor sublimis — 3 Large bursa behind the tendon of the flexor pollicis longus, between it and the fore part of the radius, capsular ligament of the wrist, and os trapezium —4 Large bursa behind the tendons of the flexor digitorum profundus, and on the fore part of the end of the radius and fore part of the capsular ligament of the wrist In some subjects it communicates with the former —5 Oblong bursa, between the tendon of the flexor carpi radialis and os trapezium —6 Very small bursa between the tendon of the flexor carpi ulnaris and os pisiforme

On the back part of the hand and wrist —7 Bursa between the tendon of the abductor pollicis longus and the radius —8 Large bursa between the two extensores carpi radialis —9 Another below it, common to the extensores carpi radiales —10 Bursa at the insertion of the tendon of the extensor carpi radialis —11 Oblong bursa for the tendon of the extensor pollicis longus, and which communicates with 9 — 12 Bursa, for the tendon of the extensor pollicis longus, between it and the metacarpal bone of the thumb —13 Bursa between the tendons of the extensor of the fore, middle and ring fingers —14 Bursa for the extensors of the little finger —1 Bursa between the tendon of the extensor carpi ulnaris and ligament of the wrist There are also bursae mucosae between the musculi lumbricales and interossei

V Near the hip joint On the fore part of the joint —1 Ileo puberal, between the iliacus internus, psoas magnus, and the capsular ligament of the head of the femur —2 Pectineal between the tendon of the pectineus and the thigh bone —3 Small bursa of the gluteus medius muscle, situated between it and the great trochanter, before the insertion of the pyriformis — 4 Bursa of the gluteus minimus muscle, between its tendon and the great trochanter —5 Gluteo-fascial, between the gluteus maximus and vastus externus

On the posterior part of the hip joint —6 Tubero ischiatic bursa, between the obturator internus muscle, the posterior spine of the ischium, and its tuberosity —7 Obturatory bursa, which is oblong and found between the obturator internus and gemini muscles and the capsular ligament —8 Bursa of the semi membranosus under its origin and the long head of the biceps femoris —9 Gluteo trochanteral bursa, between the tendon of the psoas muscle and the root of the great trochanter —10 Two gluteo femoral bursae between the tendon of the gluteus maximus and os femoris —11 Bursa of the quadratus femoris between it and the little trochanter —12 Iliac bursa, between the tendon of the iliacus internus and the little trochanter

VI Near the knee joint —1 Supra genual which adheres to the tendons of the vastus and cruralis and the fore part of the thigh bone — 2 Infra genual bursa, under the ligament of the patella, and often communicates with the above —3 Anterior genual, placed between the tendon of the sartorius, gracilis, and semi tendinosus, and internal and lateral ligament of the knee —4 Posterior genual, which is sometimes double and is situated between the tendons of the semi membranosus, the internal head of the gastrocnemius, the capsular ligament, and internal condyle — 5 Popliteal conspicuous between the tendon of that muscle, the external condyle of the femur the semilunar cartilage, and external condyle of the tibia — 6 Bursa of the biceps cruris between the external part of the tendon of the biceps cruris, and the external lateral ligament of the knee

VII In the foot On the back, side, and hind part of the foot — 1 Bursa of the tibialis anticus, between its tendon, the lower part of the tibia and capsular ligament of the ankle — Bursa between the tendon of the extensor pollicis pedis longus the tibia and capsular ligament of the ankle —3 Bursa of the extensor digitorum communis between its tendons, the tibia, and ligament of the ankle —4 Large bursa, common to the tendons of the peronei muscles —5 Bursa of the peroneus brevis, proper to its tendon — 6 Calcaneal bursa, between the tendo Achillis and os calcis

In the sole of the foot —1 Bursa for the tendon of the peronaeus longus —2 Bursa common to the tendon of the flexor pollicis pedis longus, and the tendon of the flexor digitorum pedis communis longus profundus —3 Bursa of the tibialis posticus, between its tendon, the tibia, and astragalus —4 Five bursae for the flexor tendons which begin a little above the first joint of each toe and extend to the root of the third phalanx or insertion of the tendons

Glands

These are small, round, vascular bodies which serve for the secretion or alteration of a fluid They are hence either secretory or lymphatic The former only belong to the present chapter, which differ from the latter by the possession of an excretory duct for the discharge of the fluid secerned They are divisible into follic ulose, glomerate, and conglomerate, they are also divided from the liquid they secrete or change, into sebaceous, muciparous, lymphatic lachrymal, salival, bilious, lacteal &c

A follicle, or folliculose gland, consists of a hollow vascular membrane having an excretory duct, as the muciparous and sebaceous glands

A glomerate gland is formed of a glomer of sanguineous vessels has no cavity, but is furnished with an excretory duct, as the lachrymal and mammary glands

A conglomerate gland is composed of many glomerate glands, whose excretory ducts ..., and form one large canal ... creas and salival glands bel... do many other viscera mo... under the division splanch...

The excretory duct of g...

which goes out of the g nd and excerns the secreted fluids by the contractility of its coats The nerves and vessels of gland are numerous, and, in most instances come from the neighbouring parts Some particular gland are however, supplied with vessel proper to them, as the visceral gland, the thyroid, prostate &c Glands are connected with other part by cellular membrane They are larger in infants than in adults, and may be thus subdivided

1 Subcutaneous glands sebaceous, and situated under the skin which they perforate by their excretory ducts

2 The glands of the dura mater, called also, after their discoverer Pacchionian, small fatty substances, situated near the superior longitudinal sinus of the dura mater in peculiar foveolæ of the ... parietal bones

3 The pituitary gland, situated in a duplicature of the dura mater in the sella turcica of the sphenoid bone The infundibulum of the brain terminates in this gland

4 Meibomius glands, small and numerous sebaceous glands, situated under the skin of the eyelid, near their margin Their excretory ducts open on the margins of the tarsus, and are called puncta ciliaria

5 Lachrymal gland, situated above the external angle of the orbit in a peculiar depression of the frontal bone It has six or eight excretory canals, through which the tears are conveyed, and which open upon the internal surface of the upper eyelids

6 Caruncula lachrymalis, a small and red prominence obvious in the internal angle of the eye, ... eyelids It ... sebaceous gland, which secrete a feculent humour

7 The pituitary membrane lining the nostrils and sinuses is every where furnished with muciparous glands, which secrete the mucus of the nose

8 The ceruminous glands under the skin of the meatus auditorius externus, secrete the wax of the ears

9 The glands of the mouth, which secrete the saliva, called salival they are,

α Parotids Two large conglomerate glands, situated one under each ear, between the mamillary process of the temporal bones and angle of the lower jaw The excretory canal of this gland opens in the mouth and is called, from its discoverer the Stenonian duct

β Maxillary Which are conglomerate glands situated under the angles of the lower jaw The excretory ducts of these gland are also called, after their discoverer, Warthonian

γ Sublingual, situated under the tongue

δ Glands of the cheek, situated on the internal surface of the cheeks

ε Labial glands; on the internal surface of the lips, under the common membrane of the mouth

ζ Molar glands; on each side of the mouth between the masseter and buccinator muscles Their excretory ducts open near the last dentes molares

10 External glands of the neck as follow — Jugular glands, found under the skin of the neck about the external jugular veins they are in general about twenty in number.

Submaxillary glands, and situated in the fat under the jaw

Cervical, found under the cutis in the fat about the neck

Thyroid A large gland lying upon the cricoid cartilage trachea, and horns of the thyroid cartilage It is uncertain whether it be globate or conglomerate Its excretory duct has never been detected and its use is unknown

11 Glands of the fauces, situated under the membrane which lines this cavity, muciparous, and divided, from their situation into palatine, uvular, tonsil, lingual, laryngeal, and pharyngeal

12 The mammary, or lacteal gland, situated under the fat of the breasts Their excretory ducts are called tubuli lactiferi and tubuli galactoferi, they proceed to the nipple, in which they open

13 Glands of the thorax, as follow — The thymus, large and peculiar to the fetus, and which disappears soon after birth situated in the anterior duplicature or space of the mediastinum, under the superior part of the sternum, and above the pericardium An excretory duct has not been as yet detected, but lymphatics are seen going from this gland to the thoracic duct

α Bronchial, large blackish glands near the end of the trachea, and beginning of the bronchia, and which secrete a blackish mucus

β Œsophageal under the internal membrane of the œsophagus secrete the mucus of that canal

γ Dorsal, upon the fourth or fifth vertebra of the back, between them and the posterior surface of the œsophagus No excretory duct has been hitherto traced

14 Glands of the abdomen as follow — α Gastric, muciparous, and situated under the external membrane of the stomach

β Intestinal also muciparous and found in the internal membrane of the intestines ... the ...

γ Mesenteric in the cellular membrane of the mesentery The chyle from the intestine passes through these glands to the thoracic duct

δ Hepatic ... called acini biliosi and penicilli which form the substance of the liver, and separate the bile into small ducts which ... terminate in the ductus hepaticus See Liver

ε Cystic muciparous ... found under the internal membrane of the gall bladder, especially about its neck

ζ Pancreatic which constitute the pancreas a small duct ... from each gland which unite to form the ductus pancreaticus See Splanchnology

η Epiploic or omental globate, and situated in the omentum

15 Glands of the loins as follow — α Supra renal, in the adipose membrane, one above each kidney An excretory duct has never been detected and their use is unknown

β Kidneys See Splanchnology

γ Lumbar, globate and situated about the beginning of the thoracic duct

δ Iliac, found about the beginning of the iliac vessels

ε Sacral, globate glands, and adhere to the os sacrum

16 Glands of the organ of generation of man as follow — α Odoriferous of the glans penis, sebaceous, and situated around the corona glandis

β Mucous of the urethra under the internal membrane of the urethra The mouths of their excretory ducts are called lacunæ

γ Cowper's, so called from their discoverer three large muciparous gland, two of which are situated before the prostate gland under the ac

acceleratores urinæ and the third more forward before the bulb of the urethra

δ Prostate, a very large heart like, firm gland, situated between the neck of the urinary bladder and bulbous part of the urethra Secrete a lacteal fluid, which is emitted into the urethra by ten or twelve ducts near the verumontanum, during coition

17 Glands of the female organs of generation as follow — α Odoriferous of the labia majora and nymphæ, sebaceous, and situated under the skin of those parts

β Odoriferous of the clitoris numerous, situated about the basis of the clitoris, and of the same nature as the former

γ Mucous of the urethra, under the internal membrane of the urethra

δ Mucous of the vagina, under the internal membrane of the vagina

18 Glands of the extremities as follow —Of the groin, or inguinal globate, or lymphatic, situated in great numbers in the cellular membrane of the inguinal region and receive the lymphatic vessels from the glans penis and lower extremities

Subaxillary also globate and situated in the cellular membrane of the arm-pit, numerous and receive the lymphatic vessels from the breasts and superior extremities

19 Glands of the joints are the small fat-like masses situated within the moveable joints, and erroneously called synovial their structure is not glandular they are composed of adeps and a membrane similar to the internal surface of the membrane of the joint, which gives them a fimbriated appearance By these little masses the synovia is separated from the blood for the easy motion of the joint

NEUROLOGY, or, DOCTRINE of the NERVES

Nerves are long whitish pulpy tubes composed of bundles of smaller fibres or tubuli which serve for sensation They originate from the cerebrum cerebellum, medulla oblongata, and medulla spinalis Those which arise from the cerebrum, cerebellum, and medulla oblongata, are called cerebral nerves, and those from the spinal marrow, spinal nerves All the other nerves of the body arise from these two sources

They terminate in the organs of sense viscera vessels muscles, bones, &c And are divided into trunks branches, branchlets, capillary tubules papillæ, nervous plexuses, and ganglions, or knots

The nerves consist of thirty-nine pairs,—nine of cerebral and thirty of spinal The nine pairs of cerebral nerves are, 1 The olfactory 2 The optic 3 Oculorum motorii 4 The pathetic, or trochleatores 5 The trigemini or divisi 6 The abducent 7 The auditory and facial 8 The par vagum, or great sympathetic nerves 9 The lingual pair

The thirty pairs of spinal nerves are divided into eight of cervical, twelve of dorsal, five of lumbar and five of sacral nerves

All the cerebral and spinal nerves are covered at their origin by the pia mater, and at their egress from the skull and spine by the dura mater, which last constitutes the vagina of the nerve, in the form of a firm cellular texture, but when the nerve arrives at its place of destination, it appears in a soft pulpy state

The ganglions, or knots of nerves are whitish red bodies, of various size and figure, somewhat harder than a nerve found in the course of many of the nerves They consist of medullary and fibrous substance their use is not known

When nerves are woven together in a net-like manner they form a plexus these are common about the abdominal viscera

Nerves are the source of sensation and in each constitute the organs of the five external senses — touch sight hearing smelling, and taste they also give motivity to the muscles

The Nerves of the Brain,

proceed immediately from the brain and in pairs that is one from each side of the brain, they are commonly called after their order, as first, second, third pair of nerves &c And as they are all subservient to some specific purpose they have also received appropriate appellations, as olfactory, optic &c

The first pair, or olfactory nerves, arise from the corpora striata, in a triangular form pass forwards becoming flatter over the parietal and frontal bones, one on each side of the crista galli, where they are flattened and enlarged and send down a number of branches which go through the cribriform foramina of the ethmoid bone, to be distributed on the pituitary membrane of the nose, on which membrane they form the organ of smelling

The second pair, or optic nerves arise from the thalami nervorum opticorum turn round the crura cerebri, becoming thinner, decussate each other, or reunited together then pass through the foramina optica, and perforate the bulb of the eye, and at last form the retina

The third pair, or oculorum motorii arise from the crura cerebri, near the pons Varolii pass forwards towards the top of the petrous portion of the temporal bone, where they perforate the dura mater and proceed to the orbit of it to be inserted into the muscles of the bulb of the eye which they move There is sometimes a branch given off from this nerve to join a branch of the fifth pair in the orbit, and form a ganglion, which is termed the lenticular or ophthalmic ganglion, whence small branches proceed to the choroid membrane of the eye, the iris, uvea, and tunica sclerotica

The fourth pair, or the pathetic nerves arise from the crura of the cerebellum laterally pass forward pierce the dura mater below the third pair, and proceed with them through the orbital fissure to be inserted into the trochlearis muscle of the eye

The fifth pair, or trigemini, arise from the anterior part of the crura of the cerebellum and are divided within the cavity of the cranium into three branches, viz the ophthalmic or orbital, and the superior and inferior maxillary

The orbital nerve gives off a branch near its origin, which unites with a branch of the sixth pair to form the great intercostal nerve, it then divides into three branches

1 The frontal which goes through the superciliary foramen, the muscles and integuments of the forehead

The lachrymal, which goes to the lachrymal gland

The nasal, which goes forwards to the inner canthus of the eye where it gives off a branch or two, returns into the cranium, and passes through

the cribriform plate of the ethmoid bone, and is distributed on the pituitary membrane

The superior maxillary nerve goes through *the foramen rotundum* and is divided into—

1 The spheno palatine which passes through the spheno palatine foramen, sends twigs to the internal pterygoid muscle, then enters the cavity of the nostrils and is lost on the Eustachian tube, soft palate and pituitary sinus of the sphenoid bone

2 The posterior alveolar branch, which descends through the foramen by the last grinder, and is distributed to the molares

3 The infra orbital nerve, which goes through the infra orbital foramen, and is distributed on the muscles of the cheek, nose, lips, and communicates with the facial nerve

The inferior maxillary goes out of the cranium, through the foramen ovale, giving branches to the muscles and glands in its course, and to the facial nerve, and divides as it passes over the pterygoid muscle into—

1 The internal lingual which is connected with the chorda tympani, and supplies the sublingual glands and contiguous muscles, but more especially the tongue

2 The more proper inferior maxillary, which goes into the canalis mentalis of the lower jaw, gives a branch to each tooth, and comes out again to supply the lower lip and chin

The sixth pair, or abducent nerves, arise from the posterior part of the pons Varolii, proceed forwards, perforate the dura mater, and send off some branches near the sella turcica, which unite with branches of the ophthalmic nerve of the fifth pair, to form the great intercostal nerve, then accompany the third and fourth pair through the orbital fissure, and are distributed on the recti externi muscles of the bulb of the eye

The seventh pair, or auditory nerves, as they are commonly called, originate on each side by two branches, the portio dura and portio mollis

The portio dura is, in fact, a nerve of the face and is therefore, with more propriety, called the facial nerve It arises from the fourth ventricle of the brain, passes through the petrous portion of the temporal bone, where it gives off the chorda tympani, proceeds through the stylo mastoid foramen, perforates the parotid gland, and then divides into seven or eight branches which constitute the pes anserinus, supply the ear, parotid gland and muscles of the face, and communicate with the branches of the fifth pair on the face

The portio mollis, or auditory nerve, arises from the medulla oblongata and the fourth ventricle, enters the internal auditory passage, and is distributed by innumerable branches on the membrane of the cochlea, vestibulum, forming the immediate organ of hearing

The eighth pair, or par vagum arise by several branches, partly from the medulla oblongata, partly from the fourth ventricle behind the pons Varolii Is connected at its origin with the accessory nerves of Willis, which ascend through the great occipital foramen from the sixth cervical nerve and proceeds conjointly through the foramen lacerum in basi cranii The accessory nerve then separate from the par vagum, and vanish in the sterno cleido mastoideus and cucullaris muscle The par vagum gives off branches in the neck to the tongue, larynx, and thyroid gland, from which they acquire names, and then descends into the cavity of the thorax, where it gives off—

1 The right and left recurrent the former arises on the right side, near the subclavian artery *which it surrounds* and then returns upwards to *the thyroid gland* the latter arises under the arch of the aorta which it surrounds, and then ascends to the œsophagus Both nerves are lost in the muscles of the larynx and pharynx

2 Several branches which proceed to the superior part of the pericardium, to form with other nerves the cardiac plexus, which sends branches to the heart

3 The par vagum then extends on the posterior surface of the lungs on each side, and gives off some branches, which, with others from the cardiac plexus and recurrent nerves, form a right and left pulmonic plexus, which supplies the lungs and trachea

4 Both trunks of the par vagum then descend with the œsophagus, and give off many ramifications, which form the œsophageal plexus, from which the œsophagus and adjoining parts are supplied

5 Having passed the diaphragm with the œsophagus, they form about the cardia, two stomachic plexuses the anterior is expanded over the anterior surface of the stomach and its great curvature, the posterior over the posterior surface and less curvature, and it transmits also branches to the liver, pancreas, and diaphragm

6 The par vagum also sends some branches to unite with the great intercostal and thus concurs in forming the hepatic, splenic and renal plexuses

The ninth, or lingual pair of nerves, arise from the medulla oblongata between the corpora olivaria and pyramidalia pass out of the skull through the foramina condyloidea anteriora, and communicate with the par vagum and first pair of cervical nerves proceed forwards between the jugular vein and carotid artery and are distributed on the muscles of the tongue and os hyoides

Thus it appears that the olfactory and ophthalmic nerves, and the oculo um motorii, arise from the cerebrum the trochleatores and trigemini from the cerebellum, and the auditory par vagum, and linguales, from the medulla oblongata

The nerves of the Medulla Spinalis,

called also spinal nerves pass out through the lateral or intervertebral foramina of the spine

Each nerve arises by two twigs, which unite and form a small ganglion before the nerve leaves the vertebral canal They receive a covering from the dura and pia mater, which accompanies them to their ultimate terminations

The spinal nerves are divided into cervical, dorsal, lumbar, and sacral

The cervical nerves are eight pairs and are to be distinguished from the nerves which pass from the brain along the neck

The first or occipital, arise from the beginning of the spinal marrow, pass out between the margin of the occipital foramen and atlas, form a ganglion on its transverse process, and are distributed about the occiput and neck

The second pair send a branch to the accessory nerve of Willis, and proceed to the parotid gland and external ear

The third supply the integuments of the scapula, cucullaris, and triangularis muscles, and send a branch to assist in forming the diaphragmatic nerve

The fourth sends off two branches, one to unite with branches from the second and fifth cervical pairs, which union forms the accessory nerve of Willis, the other to unite with a branch from the third and fifth cervical, which forms the diaphragmatic nerve

The fourth, fifth, sixth, seventh, and eighth pairs converge to form the brachial plexus, from which arise the accessory nerves of Willis, the diaphragmatic nerve, and the nerves of the upper extremities, which therefore belong to this section

The accessory nerve of Willis,

arises on both sides of the neck from the union of branches from the second fourth, and fifth pairs, proceeds upwards through the great occipital foramen to the medulla oblongata, joins the par vagum, and accompanies it out of the skull, through the foramen lacerum in basi cranii, and leaves it to be distributed on the cucullaris and sterno cleido mastoideus muscles

The diaphragmatic or phrenic nerve is formed in the neck by the union of the branches from the third, fourth, and fifth cervical pairs, and by a branch coming from the first pair of dorsal nerves, and another from the great intercostal passes between the clavicle and subclavian artery into the thorax, and descends along the pericardium to the upper surface of the diaphragm, where it divides into numberless branches, which are lost in its substance

All the nerves of the upper extremities arise from the brachial plexus situated in the neck, which is chiefly constituted by the union of the five lowermost cervical nerves, and a large branch of the first pair of the back Several small branches are first given off to contiguous parts, and then—

1 The axillary nerve which sometimes arises from the radial nerve, and is lost in the muscles of the scapula

2 The external cutaneal, which perforates the coraco brachialis muscle, to the bend of the arm, where it accompanies the median vein as far as the thumb and is lost in its integuments

3 The internal cutaneal, which descends on the inside of the arm, where it bifurcates From the bend of the arm, the anterior branch accompanies the basilic vein, to be inserted into the skin of the palm of the hand, the posterior branch runs down the internal part of the fore arm, to vanish in the skin of the little finger

4 The median nerve which accompanies the brachial artery to the cubit then passes between the brachialis internus pronator rotundus, and the perforatus and perforans, under the ligament of the wrist to the palm of the hand, where it sends off branches in every direction to the muscles of the hand, and then supplies the digital nerves which go to the extremities of the thumb, fore and middle fingers

5 The ulnar nerve, which descends between the brachial artery and basilic vein, between the internal condyle of the humerus, and the olecranon and divides in the fore arm into an internal and an external branch The former passes over the ligament of the wrist and sesamoid bone, to the hand, where it divides into three branches, two of which go to the ring and little finger, while the third forms an arch towards the thumb in the palm of the hand, and is lost in the continuous muscles The latter passes over the tendon of the extensor carpi ulnaris and back of the hand to supply also the two last fingers

6 The radial nerve which sometimes gives off the axillary nerve It passes backwards about the os humeri, descends on the outside of the arm, between the brachialis externus and internus muscles to the cubit then proceeds between the supinator longus and brevis to the superior extremity of the radius, giving off various branches to adjacent muscles It then divides into two branches, one going along the radius between the supinator longus and radialis internus to the back of the hand and terminates in the interosseous muscles, the thumb, and three first fingers the other passing between the supinator brevis and head of the radius, and lost in the muscles of the fore arm

The dorsal nerves are twelve pairs in number The first pair gives off a branch to the brachial plexus All the dorsal nerves are distributed to the muscles of the back, intercostals serrati, pectoral, abdominal muscles and diaphragm The five inferior pairs go to the cartilage of the ribs, and are called costal

The five pair of lumbar nerves are bestowed about the loins and its muscles the skin of the abdomen and loins, scrotum, ovaria, and diaphragm The second, third, and fifth pair unite and form the obturator nerve which descends over the psoas muscle into the pelvis and passes through the foramen thyroideum to the obturator muscle triceps pectineus &c

The third and fourth, with some branches of the second pair, form the crural nerve, which passing under Poupart's ligament with the femoral artery, sends off branches to the adjacent parts, and descends in the direction of the sartorius muscle to the internal condyle of the femur whence it accompanies the saphena vein to the internal ankle to be lost in the skin of the great toe

The fifth pair are joined to the first pair of the sacral nerves

The sacral nerves,

consist of five pairs, all of which arise from the cauda equina, or termination of the medulla spinalis, so called from the nerves resembling the tail of a horse The four first pairs give off branches to the pelvic viscera, and are afterwards united to the last lumbar, to form a large plexus, which give off—

The ischiatic nerve, the largest in the body, which immediately at its origin sends off branches to the bladder, rectum, and parts of generation, proceeds from the cavity of the pelvis through the ischiatic notch, between the tuberosity of the ischium and great trochanter to the ham, where it is called the popliteal nerve In the ham it divides into two branches

1 The peroneal, which descends on the fibula, and distributes many branches to the muscles of the leg and back of the foot

2 The tibial, which penetrates the gastrocnemii muscles to the internal ankle, passes through a notch in the os calcis to the sole of the foot, where it divides into an internal and external plantar nerve, which supply the muscles and aponeurosis of the foot and the toes

The great intercostal or sympathetic nerve arises in the cavity of the cranium from the union of a branch of the sixth with a recurrent twig of the second branch of the fifth pair It passes out of the cranium through the carotid canal,

and descends on the sides of the cervical, dorsal, and lumbar vertebræ and sacrum, in which course it is joined by filaments from all the spinal nerves, forming small ganglions at their junction

In the neck it forms only three ganglions, which are called cervical

1 The uppermost is situated upon the second vertebra behind the pharynx, it sends branches which concur in forming the pulmonic and cardiac plexuses and several other twigs which unite with the lingual nerve, the par vagum, and the two other ganglions

2 The middle ganglion which is situated on the fourth cervical vertebra

3 The lowermost ganglion, which is the least, and placed on the last cervical vertebra The branch goes off from it, and surrounds the subclavian artery and several others, which unite with other branches from the par vagum, and form the cardiac plexus

The trunk of the great intercostal then descends behind the subclavian artery by the sides of the transverse processes of the dorsal vertebræ, through the cavity of the chest, receiving two branches from each of the dorsal nerves coming from the spinal marrow, as it passes along and forming as many small ganglions quits the side of the vertebræ, accompanies the aorta and having reached the sacrum, produces several ganglions, with the spinal branches coming from this part and, lastly, is reflected inwards about the os coccygis, and joins its fellow of the opposite side Having thus described the course of this nerve, so justly termed the great sympathetic, it still remains to enumerate the several abdominal plexuses which arise from it,—for the viscera of the abdomen are all supplied from the great intercostal

The fifth dorsal ganglion of the intercostal sends off a nerve into the thorax, the third dorsal ganglion also sends off a nerve, a nerve proceeds from the seventh dorsal ganglion, another the eighth ganglion, and another from the ninth and tenth, or sometimes from the eleventh dorsal ganglion These five branches, given off by the dorsal ganglia, descend in the thorax in the course of the vertebræ, and pass through the diaphragm into the abdomen, where they all unite into one trunk on each side, and this nerve is called the splanchnic, or little, or anterior intercostal

The splanchnic intercostal nerve proceeds a very little way from the diaphragm and then produces a large ganglion on the anterior part of the aorta of a semilunar form termed the semilunar ganglion; some small twigs pass from it, and form a net-work, which is termed the solar plexus The two semilunar ganglia send several branches to unite with and form the following abdominal ganglia;

1 The cœliac plexus surrounding the cœliac artery, and formed by the union of several branches from the solar plexus and semilunar ganglion

2 The hepatic plexus arising from branches given off from the cœliac plexus, and uniting with those coming from the semilunar ganglion supplies the vena portarum, the gall bladder, liver, duodenum and omentum, with nerves

3 The splenic plexus arising from branches given off from the cœliac plexus and right semilunar ganglion, and passing with the vessels into the spleen, whence it sends branches to the stomach and pancreas

4 The superior mesenteric plexus formed by the union of several branches from the semilunar and solar ganglion, and the former plexuses sends nerves to the mesentery, mesocolon, and mesenteric glands

5 The renal plexus formed by branches of the semilunar ganglions and the superior mesenteric plexus the kidnies are hence supplied

6 The inferior mesenteric plexus situated near the inferior mesenteric artery

7 The mesocolic, or posterior mesenteric plexus arising from the union of several nerves sent over the aorta from the superior mesenteric and renal plexuses, supplies the mesentery and intestines

8 The hypogastric plexus formed by branches from the superior and inferior mesenteric plexus, and situated at the fourth vertebra of the loins soon divides into two branches, in each of which is a ganglion that sends nerves to the urinary bladder, rectum, and contiguous parts

9 The spermatic plexus supplying the spermatic vessels, testes, ovaria, &c

Splanchnology, or, Doctrine of the Viscera

By the viscera, or visceral organs, are generally understood the larger organs alone of the thorax and abdomen Pliny, however, and several other Roman writers have so far extended the term as to make it embrace every organ that lies beneath the common integument of the skin The Greek term σπλαγχνα which is synonymous with that of viscera, is capable were it necessary so to employ it, of an equal latitude It is proper, however, to premise that in the present anatomical arrangement splanchnology or the doctrine of the viscera, is designed to include the general mass of the soft parts of an animal, not described under the foregoing divisions together with their respective appurtenances and involucres

Splanchnology therefore thus considered may be contemplated under the four sections of the head, thorax, abdomen, and extremities

Head

The parts which form the head are divided into external and internal

The external parts are the common integuments, hair, a tendinous expansion, three pair of muscles, pericranium, and cranium itself

The internal parts are, the dura mater, membrana arachnoidea pia mater, cerebrum, cerebellum, medulla oblongata nine pair of nerves, four arteries, and twenty two venous sinuses

The dura mater, or meninx is a strong thick, fibrous, insensible membrane, situated immediately under the cranium to which it adheres very firmly, covering the external surface of the brain It is composed of two strong membranous layers, or laminæ The external layer lines the internal surface of the cranium, supplying the place of periosteum The internal layer is closely connected to the external by cellular structure, in many places, however, they are separated so as to form a space, or sinus, in which the blood passes as through veins to be returned towards the heart The latter also forms several processes, the chief of which are the following

1 The falx, or falciform process, or septum cerebri, which originates by a very firm attachment, from the middle of the sphænoid bone and crista galli, within the cranium, and rises up

wards like a bow, adhering to the external lamina of the dura mater immediately covering the middle of the frontal bone, the sagittal suture, and occipital bone until it arrives at the meeting of the internal crucial spine of the occipital bone, where it unites to the tentorium. Its superior part contains the longitudinal sinus.

2. The tentorium or septum transversum, arising from the clinoid processes of the sphenoid bone and passing horizontally backwards, being attached to the horizontal ramus of the crucial spine of the occipital bone. It separates the cerebrum from the cerebellum.

3. The septum cerebelli passing below the tentorium, like a continuation of the falx, and lying between the lobes of the cerebellum. There are several smaller processes which need not be mentioned.

The veins or sinuses of the dura mater are—

1. The longitudinal, which commences at the origin of the falx and passes within it, of a triangular form upwards, and immediately under the sagittal suture of the cranium to the occipital tubercle, where it bifurcates into the lateral sinuses.

Within this sinus are a number of tendinous fibres or trabeculæ which cross the sinus in various directions from one side to another.

2. The lateral sinuses which are continued, one along each transverse or horizontal branch of the crucial spine of the os occipitis, downwards to the foramen lacerum in basi cranii, where they pass out of the cranium, and commence the two internal jugular veins.

3. The torcular herophili, a small vein or sinus in that part of the processes formed by the meeting of the tentorium, falx, and septum cerebelli; it proceeds directly backwards to the bifurcation of the longitudinal sinus.

Besides these there are many other small sinuses which we cannot at present notice.

The arteries of the dura mater beautifully disposed in an arborescent form, are branches of the arteria spinosa, the meningea anterior and posterior. No nerves have been satisfactorily discovered.

The membrana arachnoidea, or tunica arachnoides, is very delicate and transparent, situated between the dura and pia mater, and surrounding the cerebrum, cerebellum, medulla oblongata and spinalis. Resembles a spider's web only near the basis of the cranium, where it is very vascular; in other parts diaphanous like the pleura and peritoneum; enters also the cavities of the brain, which it lines, and forms the membrane covering the thalami nervorum opticorum, corpora striata, pedes hippocampi, and fourth ventricle. Use unknown.

The pia mater, or meninx, is the third covering of the brain, cerebellum, medulla oblongata and spinalis, highly vascular and delicate, embracing those parts closely, penetrating between their convolutions, and sending a vast number of vessels to the cortical substance of the cerebrum and cerebellum.

The tomentum cerebri consists of the fine vessels that are sent from this membrane into the brain, which, when pulled out by artificial means, gives the internal surface of the pia mater a flocose appearance. Use not thoroughly known.

The cerebrum encephalon, sensorium commune, or brain, is a large viscus, somewhat of an oval figure, situated in the cavity of the cranium.

That which is called brain in common language, consists of the cerebrum, cerebellum, and medulla oblongata.

The brain is composed of three substances, the medullary, cortical, and black substance. Some anatomists have enumerated a fourth.

1. The medullary is of a delicate white colour; it composes the greater part of the whole brain.

2. The cortical, called also cineritious, encircles the whole brain, and is found in many of its internal parts; the portion which covers the medullary part is highly vascular, receiving the vessels.

3. The black substance is observed by making a transverse section through the crura cerebri, in the middle of which it is situated.

The cerebrum is divided by a large fissure into two hemispheres, which are united both above and below by portions of the brain called commissures. The under surface of the brain is more irregular and presents six distinct lobes, which correspond to the six depressions, or fossæ, in the base of the skull, so that the two anterior lobes rest on the frontal bone, the two middle, in the depressions made by the sphenoid bone, and the two posterior lobes pass over the cerebellum to occupy the superior occipital depression. When the pia mater is removed the brain has somewhat the appearance of an irregular convoluted mass heaped together; there are spaces between the convolutions, or gyri, which allow the processes of the pia mater to pass some way down; these are termed interpyral spaces of the brain. One of the convolutions going considerably deeper than the rest, and seen when a horizontal section of the brain is made below the corpus callosum, first noticed by Sylvius, has ever since been termed fissura Sylvii. Upon the under surface of the brain, between the middle lobes, two processes are sent downwards and backwards, like legs; these are termed the crura cerebri; they are soon encompassed by the crura cerebelli to form the pons Varolii. There are also two round white bodies seen before these like two peas, called the corpora candidantia Willisii.

When the two hemispheres of the brain are separated a little from one another, a white substance presents itself; this is the commissura superior; it is also termed the corpus callosum, and commissura magna cerebri, and the elevated line running along its middle is the raphe. The commissura superior is covered by a portion of the hemispheres of the brain, which lap, as it were, over it on each side; these portions are termed the labia cerebri. When the hemispheres of the cerebrum are cut away in a direct line with the exterior of the commissura superior, a large surface of the medullary substance is brought into view, this is the centrum ovale; the commissura superior cerebri, its raphe and striæ, and the cortical substance of the brain, may now be examined minutely.

There are four cavities within the remaining portion of the cerebrum called ventricles, two of these situated laterally, are called lateral ventricles; at their upper part they are separated from each other by a very delicate partition, in which is another cavity, but inferiorly they are at a greater distance from each other, so as to allow of a considerable portion of brain and a cavity to be situated between them, and this cavity is the third ventricle.

An incision must now be made on either side of the raphe of the commissura superior cerebri, into one of the lateral ventricles and its upper and outer parietes removed so as to completely expose the cavity. It is termed the lateral ventricle from its situation its figure is triangular, having three sinuses or horns, hence it is also called the tricorn cavity. The following are to be noticed in each lateral ventricle

1 A very delicate and pellucid membrane separating one cavity from the other called septum lucidum. There is occasionally, a small cavity between the laminæ composing this septum called the fifth ventricle by professor Sommering

2 A convex brown coloured body ... rior sinus, called corpus striatum ... form ... its round end turned toward ... face, and its taper end or crus, backwards

3 A portion of a white convex body ... thalamus nervi optici situated behind the former, and separated from it by an opake line in which there is a blood vessel. The line of separation is called geminum centrum semicirculare, and tænia semicircularis

A part only of the thalami nervorum is seen in this ventricle the ... separates the lateral ventricle ... ventricle goes over their ... so that the greater part of each thalamus ... in the third ventricle

4 ... vascular substance ... between these parts and the bottom of the septum lucidum, termed plexus choroides. This plexus comes into the lateral ventricle at its superior and anterior cornu and the hole through which it comes is the foramen Monroianum

The choroid plexus passes over the portion of the thalamus of the optic nerve in this ventricle, into the inferior cornu

5 The corpus fimbriatum, a flat tape like substance, which goes downwards from the bottom of the septum lucidum into the posterior and inferior horns of this cavity

6 The unguis, or hippocampus minor, a convex body like the nail of the little finger, situated in the posterior horn of the ventricle, and arising from the corpus fimbriatum

7 The pes hippocampi, called also cornu ammonis and hippocampus major a long convex substance occupying the whole of the inferior cornu and arising from the corpus fimbriatum

8 A number of columns, more evident in some brains than in others passing round the superior and posterior parietes of the lateral ventricle, called columna anonyma

The fornix lies at the bottom of the septum lucidum, which arises by the inside of each corpus striatum, and passes upwards and backwards like an arch, and then divides posteriorly and all this in less than the space of an inch. It arises by two pillars, about a quarter of an inch in length of the thickness of a crow quill, one from each side below the corpus striatum. These are called its anterior crura. They are connected by a medullary substance. Having passed over the choroid plexus the crura unite and continue united for a very little way, they then separate, and proceed backwards and outwards, by the name of the posterior crura of the fornix, and are soon flattened when they become the corpora fimbriata, which pass round into the posterior and inferior horns of the lateral ventricles.

The space between the posterior crura of the fornix is triangular, and marked with a number of depressed lines not always conspicuous, it is termed the psalterium or lyra from its supposed resemblance to David's harp. These circumstances are seen by dividing the two anterior crura of the fornix and turning it backward with the septum lucidum and commissura superior cerebri

The lamina or net-work of vessels lying over the third ventricle in contact with the fornix and psalterium, is called velum interpositum in it are two veins, the venæ magnæ Galeni which unite just before the torcular and return their blood into the torcular of Herophilus

When the ... are removed, and ... um interpositum ... space or cavity is ... between two large rounded bodies which ... third ... ventricle ... whole is now brought ... here are mostly one or two elevations on the ... bulum, one sometimes in the portion within the lateral ventricles, and one under the corpus striatum, these are termed the colliculi of the thalami nervorum opticorum. In the third ventricle are to be noticed

1 The commissura anterior cerebri, or anterior commissure. This is a band like a nerve the thickness of a crow quill, going across the anterior part of the third ventricle and uniting, as it were, one side of the cerebrum to the other it lies horizontally immediately below the anterior crura of the fornix

2 The third ventricle runs forward and this commissure becoming smaller until it terminates in a slender red substance, which sometimes solid and sometimes hollow this funnel shaped portion is the iter ad infundibulum it ends in the pituitary gland situated in the sella turcica

3 The bottom of the third ventricle is formed by a portion of the medullary substance of the brain going across from one side to the other, in the same way as the commissura superior does it is therefore termed the commissura inferior cerebri

4 The ... an elevated line on the side of each thalamus nervi optici in the third ventricle which runs backwards, these meet posteriorly and have a small, heart shaped, pulpy substance attached to them which is the pineal gland, these lines are termed the peduncles, or crura of the pineal gland

5 Before the gland and below its crura is a nervous band opposed to that in the anterior part of the ventricle called commissura posterior cerebri. It cannot be traced penetrating the brain like the anterior

6 Immediately under this commissure is an opening, opposed to the iter ad infundibulum which penetrates through the medulla oblongata and is termed the iter a tertio ad quartum ventriculum, or aqueduct of Sylvius

Behind the posterior commissure are four rounded eminences, called corpora quadrigemina two are situated superiorly, and two inferiorly, they were formerly called nates and testes

The third ventricle is lined by a delicate membrane, a reflection of the pia mater, or membrana arachnoides, which secretes the subtile vapour by which it is lubricated

The cerebral nerves, &c have been already described

The cerebellum or little brain, is of a round figure, and situated under the tentorium of the dura mater in the inferior occipital depressions. It is divided into two lobes by a process of the dura mater, and sends four processes, or crura, forwards which, with the crura of the cerebrum, appear to constitute the medulla oblongata. The cerebellum is composed, like the brain, of a cortical substance and a medullary, and is closely covered by the pia mater which sends processes between its convolutions that appear more regular than the convolutions of the cerebrum. These first divide the ... cerebellum into laminae, ... like the leaf of the ... so that when the cerebellum is cut ... the cortical substance ... the appearance of ... and its branches ... [illegible] ... the cerebellum ... from the ... which ... may be ... The two lobes of the cerebellum ... internally by a long ... the fourth ventricle which has a communication ... by means of a long canal ...

... ventriculum, ... the ...

... the fourth ventricle ... formed ... the medulla oblongata posteriorly and ... by the cerebellum hence it is common to both ... in it are to be observed—

1 A thin medullary portion connecting the medulla oblongata to the cerebellum and lying immediately between the crura, superiorly and above the opening of the iter into the fourth ventricle, this is called the valvula magna cerebri

2 A plexus of vessels, and apparently small glands called the plexus of Haller

3 A depressed line extending down the medulla oblongata in the cavity, which is called the calamus scriptorius

4 Two or three delicate white ... like nerves which are the origins of ... the portio mollis, or auditory nerve

The vermiform processes are ... and behind the crura cerebelli and are merely a portion of the cerebellum more protuberant than the rest whose convolutions are bundled round like a number of small worms

The medulla oblongata is a white firm, medullary substance situated beneath the cerebrum and before the cerebellum, and lying upon the cuneiform process of the occipital bone. It is broad and rounded above, and narrower below where it is continued into the medulla spinalis. From its appearance it favours the idea of its being formed by the crura cerebri in its middle encompassed by the crura cerebelli becoming flattened as they pass over the former. Upon its anterior surface are to be observed—

1 The pons Varolii, called also corpus annulare, which forms the upper and anterior part it is convex, and covered with many striæ. The basilary artery runs over it

2 The corpora pyramidalia. Two eminences proceeding from the pons Varolii towards the medulla spinalis

3 The corpora olivaria. Two more oval eminences, one on each side the corpora pyramidalia, from which they are divided by a sulcus

Through the middle of the medulla oblongata, just before the corpora quadrigemina the iter a tertio ad quartum ventriculum is to be noticed

The different pairs of nerves &c originating from these origins have been noticed already

The spinal marrow is a continuation of the medulla oblongata beginning from the great occipital foramen and passing down the vertebral canal, through the cervical, dorsal and lumbar vertebræ, where it terminates in a number of long nerves which, from their resemblance to a horse's tail, are called the cauda equina. It is composed, like the brain, cerebellum and medulla oblongata, of nervous matter which is distinguished ... medullary and cortical substance ... external, and the latter internal ... whole course the spinal marrow ... by the pia mater, tunica arachnoides and dura mater and there is a ligament... the interstices of the origin of the ... the first cervical to the twelfth dorsal ... called the ligamentum serratum, or ... The nerves given off by the spinal marrow have been already considered. The eyes, ear, nose, and mouth, are appurtenances to the ... and organs of its distinct powers ... form the eye are divided into

...

... a layer of hair which ... and to ... line of red or ... and this is not absolutely known

2 The eyelids, two semilunar productions, covered internally by the conjunctive membrane and Meibomius's glands, and formed externally by common integuments and a cartilage extremely moveable, especially the upper. The cartilage between the conjunctive membrane and the common integuments of the eyelid is semilunar and termed tarsus. The edges of the eyelids have a number of short hairs arising from them and turned outwards, called cilia, or eyelashes. The use of the eyelids is to cover the eyes during sleep, to defend them from dust and other substances and too strong rays of light, and to lubricate the conjunctiva by frequently moving its secretion over the surface of the eye

3 The puncta lachrymalia, two small orifices, one at the end of each eyelid near the nose. A canal goes thence downwards and inwards, and meeting about half an inch from their origin, they form a sac, called saccus lachrymalis which is continued downwards through the ductus ad nasum into the nose. The tears are absorbed by the puncta lachrymalia and conveyed into the nose through the sac and canal

4 The lachrymal gland is situated in the superior part of the orbit in a peculiar depression. Hard conglobate, of an oval form, with a number of excretory ducts which convey the fluid called tears secreted by this gland, on the surface of the eye

5 The caruncula lachrymalis, a small red tubercle in the internal canthus of each eye. It has a number of hairs and secretes a smegma. It is also of use to direct the tears into the puncta lachrymalia

6 The tunica conjunctiva, a transparent vascular membrane, reflected from the edge of one eyelid over the internal part of the eyelid across

the bulb, to which it adheres very firmly, and then over the internal part of the other eyelid to its edge more loosely connected with the eyelids than the eye, where it passes the cornea transparens, adheres so firmly that it cannot be separated use to lubricate the eye by the moisture secreted from its transparent arteries

The internal parts of the eye are termed the bulb, they constitute the eye, properly so called, and are—

1 The sclerotic membrane A very firm, hard, white, horny tunic into which the muscles of the eye are inserted anterior part glassy and transparent, and projecting, it is called cornea transparens, to distinguish it from the other part, called cornea opaca The optic nerve is inserted into the posterior part of the sclerotic membrane which appears to be an expansion of its external tunic, continued from the dura mater

2 Immediately under the sclerotic is a very vascular soft, and rough membrane, called the membrana or tunica choroides It adheres to the sclerotic from the optic nerve all around to the edge of the transparent cornea by vessels, but when it arrives here, instead of being continued around the concavity of the cornea transparens, it passes straight downwards and inwards, forming the coloured part of the eye which is sometimes black, blue, &c This black or blue part is called the iris, which possesses a contractile power, by some supposed to arise from muscular fibres, so as to enlarge or contract the opening in its middle which is the pupil The edge of the choroid membrane that adheres to the limb t of the cornea transparens is covered with a white line to which the name of ciliary circle or ligament is given Some anatomists have supposed the choroid membrane was formed of two laminæ The posterior surface of the iris is termed the uvea

3 The posterior surface of the tunica choroides is covered with a black mucus known by the name of the pigment of the choroid membrane and uvea

4 Upon the inside of the choroid membrane, corresponding to the ciliary circle on the outside are a number of white striæ, which are called ciliary processes

5 There is a whitish, pulpy vascular membrane covering the pigment of the choroides, which is the immediate organ of vision and called the retina It passes forward from the optic nerve, and terminates in the ciliary processes

The membranes which have been described are distended with the vitreous humour crystalline lens, and aqueous humour

1 The vitreous humour or substance is a soft, round and very transparent body filling the whole hollow surface of the retina It has a cavity in its anterior surface, and is surrounded with a delicate hyaloid membrane which sends a number of laminæ, internally forming cells, which are distended with a transparent fluid

2 The crystalline lens lies in the depression in the anterior part of the vitreous humour It is a solid, transparent body, like ice, and is enclosed in a capsule

3 The aqueous humour is very fluid and transparent and fills the space between the crystalline lens and the cornea transparens

The space between the anterior surface of the crystalline lens and posterior surface of the transparent cornea, has the iris hanging like a curtain in its middle, and which divides it into two spaces these spaces are distinguished by the name of anterior and posterior chambers

The ear is distinguished into external and internal

The external ear is formed of an oval cartilage, concave before, having several eminences and depressions and convex behind, covered with common integuments

1 The external ridge is called the helix, it curls inwards 2 The antihelix, a ridge situated more internally than the helix 3 The concha, or cavity bounded by the antihelix and tragus 4 The tragus a cartilaginous eminence covered with long hairs 5 The antitragus a small depression opposite to the tragus, at the bottom of the antihelix 6 The lobule of the ear, which hangs downwards and is bored for rings

The bony meatus auditorius of the ear is lined by a cartilage and common integuments, between which are the glands that secrete the wax This canal the meatus auditorius externus, is terminated by a membrane of the tympanum

Its muscles and ligaments have been described already

The internal ear lies concealed within the petrous portion of the temporal bone it is divided into the tympanum, mastoid cells, and labyrinth

The tympanum is an irregularly round cavity covered by a muscle called the membrana tympani, like a drum by its parchment It contains four delicate bones, which together with its muscles h[illegible] d[illegible]

The labyrin[illegible] [illegible] d of the cochlea, vestibulum, and [illegible] canals, these have also been des[illegible] Osteology There remain, however to b[illegible] the soft part which are found with them and which are the immediate organ of hearing these are

The membranous semicircular canals, which [illegible] uated within the bony semicircular canal and loosely connected to the periosteum by a fine cellular membrane [illegible] quantity of fluid being interposed, which [illegible] ates through the labyrinth

The nose is divided into external and internal The former is distinguished into root, back, apex and alæ the latter into two nostrils five cartilages the frontal, ethmoidal and maxillary sinuses

1 Root, the superior part contiguous to the forehead

2 Back or bridge, the middle prominence, which goes downwards

3 Alæ, or pinnæ, the lateral and moveable parts

4 Apex or tip the inferior round part

5 The cartilages of the nose are, one in the middle, which, with the vomer complete the septum narium, and two on each side of the septum, which form the round tip, and opening into the nostrils

6 The frontal sinuses communicate with the superior part of the nostrils

7 The sphenoidal sinus opens into the posterior nostrils

8 The maxillary sinuses open into the anterior nostrils at their sides

9 Besides these parts the nostrils have the turbinated portions of the ethmoid bone and the inferior spongy bones, hanging within them and

10 The opening of the ductus ad nasum

All these parts are covered with a very vascu-

lar pituitary membrane, called the Schneiderian, from its discoverer, upon which the excretory ducts of the mucous glands open, and the olfactory nerves are beautifully distributed so that the pituitary membrane not only covers the nostrils, but the sinuses communicating with them

The cavity of the mouth is covered by the cheeks and lips

The cheeks are composed of common integuments and various muscles going downwards from under the eye, over the superior maxillary, to the inferior maxillary bone

The lips are composed of common integuments and muscles and are highly vascular, which gives them their beautiful redness in health The commissure of the lips is the angles in which they meet

The cavity of the mouth is bounded superiorly by the hard and soft palate, inferiorly by the tongue, anteriorly and laterally by the teeth, and posteriorly it is open communicating with the fauces, hence these organs are to be considered in the present section

1 The gums are a red, vascular, spongy substance of a peculiar nature, encompassing the necks of the teeth, and lying on each side the alveolar processes

2 The roof of the mouth is called the palate, the anterior portion is much harder than the posterior being partly formed of bone and hence distinguished into hard and soft The hard palate is that portion of the roof which is formed by the palate bones and palatine portions of the superior maxillary bones, it is covered with periosteum and the common membrane of the mouth, which is formed into rugæ The soft palate, or velum pendulum palati extends backwards from the hard palate forming two arches it is composed of the internal membrane of the mouth a number of glands and muscles From the middle of the velum pendulum palatinum there hangs down over the tongue a conical body like a nipple, seen when the mouth is opened, which is the uvula From the sides of the uvula, towards the sides of the tongue the soft palate forms two arches the anterior of these is fixed to the sides of the tongue but the posterior extends backwards to be inserted into the pharynx Between these two arches, on each side at their bottom, is an oblong gland called the tonsil, it has several excretory ducts opening upon its surface

The membrane covering the mouth is a reflection of the skin and epidermis it is very spongy and cellular, having a number of small glands under it, and their excretory ducts opening upon its surface

The mouth is the organ of mastication and deglutition It also affords a passage to the air in breathing, and assists in forming the sounds for speaking

The tongue is a muscular body moveable in every direction, and situated in the inferior part of the mouth

It is divided into a base, body, back, an inferior surface, and two sides

The base lies on the os hyoides

The body is the middle and larger part

The superior surface is called the back

The inferior surface is connected to the parts below by the membrane of the mouth which forms a bridle, or frenulum, behind the middle incisores

The tongue is formed of a number of muscular fibres, which are considered in Myology, covered by the common integuments

The external surface is every where covered with nervous papillæ, some of which are pyramidal others conoid, and some fungiform, they are most numerous on the sides and apex, and upon the middle of the back.

The fauces are the cavity behind the soft palate and tongue, which ends in the pharynx

It is bounded posteriorly by the bodies of all the cervical vertebræ, superiorly by the cuneiform process of the os occipitis and middle of the sphænoid bone inferiorly by the pharynx, and anteriorly it looks into the mouth

The posterior nostrils open into the fauces behind the velum pendulum palati

The Eustachian tubes have apertures at their sides

The whole of this cavity is lined with a very vascular and mucous membrane continued from the mouth and nostrils on which are the opening of many mucous glands

The pharynx is a muscular sac, like a funnel, situated behind the larynx, adhering to the fauces, and terminating in the œsophagus

The œsophagus, or gullet, as an appendage to the organ of taste, is entitled to be considered in this section It is a membranous and muscular tube, situated between the pharynx and stomach, and descending behind the trachea down the neck, and along the posterior space of the mediastinum into the abdomen

It is composed of three tunics, or coats—

1 A common tunic, which is a condensed cellular membrane

2 A muscular one, which consists of very dilatable muscular rings

3 A villous coat, situated on the inside between this and the former tunic are a number of muciparous glands which secrete the mucus of the œsophagus

The larynx is a hollow body, composed of cartilages muscles, and ligaments, situated at the root of the tongue, in the fore part of the neck

It is attached above to the os hyoides by muscles and ligaments and posteriorly to the basis of the tongue by membranes, and to the pharynx by various muscles

The cartilages which form the larynx are

1 The thyroid or scutiform, which forms the anterior and superior part, and by far the greater part of the larynx It appears to consist of two cartilages joined together anteriorly, which form a protection in the male neck, called the pomum Adami, but which recede from each other in the posterior part At the upper end of each posteriorly is a little projection these are termed the cornua of the thyroid cartilage, they are joined to the cornua of the os hyoides by a ligament

2 Two arytænoid cartilages found behind the former, placed perpendicularly upon the cricoid, and forming a space between them, the opening into the larynx, called glottis, or rima glottidis

3 The cricoid cartilage which is the basis of the others it is narrow before, and broad behind, and is immediately above the larynx

4 The epiglottis, an oval cartilage at the root of the tongue, which covers the glottis when the food passes into the pharynx

The larynx is every where covered with a very sensible vascular and mucous membrane a continuation of the membrane of the mouth

The trachea is a tube originating from the larynx in the anterior part of the neck, before the œsophagus and passing into the thorax, where it divides into two branches, called bronchia.

It is composed of cartilages, muscles, and membranes.

1 The cartilages are round, but not complete rings, for they are fleshy posteriorly, where they lie over the œsophagus.

2 The muscles of the trachea pass between these rings, and are called mesochondriac.

3 The internal surface of this tube is lined with an exquisitely sensible and vascular mucous membrane continued from the larynx.

The bronchia entering the substance of the lungs, divide into innumerable little branches, which terminate in the vesiculæ pulmonales, or air cells.

The neck is formed internally by the fauces, pharynx, œsophagus, larynx, and trachea: externally by the common integuments, muscles, nerves, and bloodvessels.

Thorax

The thorax, or chest, is that part of the body situated between the neck and belly, and to whose sides the upper extremities are attached. Its figure is pyramidal, broad and convex below, where it is separated by the diaphragm from the abdomen, and obtuse above, where it is terminated by the pleura, cellular structure, muscles, and vessels, hollow behind, owing to the convexity of the ribs as they approach the spine, convex laterally, somewhat flattened in front.

It is divided internally into five cavities.

1 A right and left cavity.

2 The cavity of the pericardium.

3 The anterior space of the mediastinum.

4 The posterior space of the mediastinum.

The parts which constitute the chest are divided into external and internal—

The external parts are the common integuments, the breasts, various muscles, and bones.

The internal parts, or proper viscera, of the thorax are, the pleura, the lungs, the thymus gland, the œsophagus, ductus thoracicus, arch of the aorta, branches of the venæ cavæ, the vena azygos, par vagum, and great intercostal nerves.

The breasts, or mammæ, are two soft hemispheres, adhering to the anterior and lateral parts of the chest over the pectoral muscle. In men, they are termed mamillæ, in women, mammæ, and in brutes, ubera.

The human breast is composed of much soft fat, which gives it the rotundity, and is of a glandular fabric, plentifully supplied with blood vessels, nerves, &c. which secrete the milk, and convey it by its excretory ducts to

The papilla, or nipple, a very irritable prominent body, in the centre of each breast, in which the excretory ducts of the glands of the breast, called galactopherous and lactiferous, open.

The nipple is surrounded by a brown circle, called the areola, or halo.

The use of these organs in the female is to secrete and contain the milk for new born infants. In the male the use is not known.

The pleura is a transparent smooth membrane, which lines the internal surface of each lateral cavity of the thorax, and covers its viscera. Its external surface is attached by vessels and cellular membrane to the ribs, intercostal muscles, sternum, bodies of the dorsal vertebræ and diaphragm, so that it may be compared to two bags: of these the right lies close to the internal surface of the ribs, down to the diaphragm, passes over it, giving it a tunic, and having reached the heart bag, near the middle of the inferior part of the chest, adheres to it, and goes up to the sternum, to the very top of the chest where the bronchia enter, and the lungs begin, and in this part the pleura is reflected over them—the left bag lines the left cavity in the same way. The pleuræ of both cavities at the sides of the bodies of the vertebræ go directly forwards to the sternum, without coming into contact with one another, a vast quantity of cellular structure being interposed, and thus divide the thorax into a right and left cavity. This partition of the chest is termed mediastinum, in which are two spaces: the anterior space is directly behind the sternum, the posterior immediately before the bodies of the dorsal vertebræ.

The mediastinum is a membranous partition formed of a duplicate of the pleura, which divides the chest into two cavities.

In the mediastinum, that is, between the two pleuræ of which it is formed, are—in the anterior part, the pericardium, the thymus gland in children—in the posterior part, the œsophagus, large vessels of the heart, the par vagum, great intercostals, and thoracic duct.

The lungs are situated in the cavities of the thorax, and are the chief organs of respiration. They are divided into right and left lung: the right has three lobes, the left only two.

The substance of the lungs is bronchial, vesicular, vascular, nervous, glandular, and parenchymatous.

1 The bronchia are continuations of the trachea, and are formed exactly of the same material, viz. cartilage and intercartilaginous muscles.

2 The vesicles of the lungs are called the pulmonary or air vesicles, they form by far the greater bulk of the lungs, and are placed at the very extremities of the ramifications of the bronchia, being apparently formed of the internal membrane lining the bronchia. It is on the internal surface of these vesicles that the pulmonary artery forms a beautiful plexus of delicate vessels.

3 The vessels of the lungs are—the pulmonary artery, whose ramifications are very numerous, forming a net of vessels on the internal surface of the air vesicles—the pulmonary veins, which return the blood from the pulmonary arteries—the bronchial artery, which nourishes the lungs, and returns its blood through corresponding veins into the vena azygos—the absorbents of the lungs, which are deep-seated and superficial.

4 The nerves of the lungs are derived from the par vagum and great intercostal, and form an anterior and posterior pulmonic plexus.

5 The glands about the bronchia are very numerous, and termed bronchial. Lymphatic glands are also found more internally.

6 The parenchyma of the lungs, or cellular membrane, connects the vessels, bronchia, and vesicles, and is very elastic.

The lungs are connected with the heart by means of the pulmonary artery and veins, and with the trachea by means of the bronchia, the other part is loose in the cavity of the chest, having a coat from the pleura, called pleura pulmonalis.

The pericardium is a membranous sac surrounding the heart.

It adheres to the diaphragm, pleura, sternum, cartilages of the ribs, œsophagus, aorta descendens, and the veins and great arteries going to and from the heart Its use is

To contain the heart and to separate a fluid which may lubricate and preserve it from concretion with the pericardium

The heart in adults is a hollow muscular viscus, situated in the cavity of the pericardium, by whose contractile power the blood is sent to every part of the body It is distinguished in the dead body, whilst in the pericardium, into an anterior and posterior surface and margins, a base from which the large arteries emerge, and an apex In the living body the base of the heart is towards the dorsal vertebræ, its apex towards the sixth rib of the left side, so that its situation is oblique, not transverse, the right ventricle being anterior, the left posterior and the inferior surface lying upon the diaphragm

The heart is divided into two auricles, which lie upon its base surrounding the larger arteries, two ventricles, or cavities, in the internal part, and the arteries and veins going from and terminating in it

The right auricle is a large muscular sac, in which the superior vena cava, and the inferior, terminate it has a little process or cul de sac, like an auricula, or little ear, from which it took its name and an opening at its bottom into the right ventricle

In the right auricle are

1 The tuberculum Loweri A mere projection in the auricle, between the two venæ cavæ

2 The valve of Eustachius A production of the inner membrane of the inferior vena cava at its termination in the auricle It is not always present, but in most instances is as complete a valve as any other

3 The fleshy bundles crossing the auricle like the teeth of a comb, called musculi pectinati Between these fascicles the auricle is transparent and membranous

4 The valve of the great coronary vein, which opens into this auricle

5 Around the opening of the auricle into the right ventricle, and rather within the auricle, is a tendinous circle

6 A flat, membranous, oval depression, more remarkable in some than in other hearts which points out the former situation of the foramen ovale

7 The foramina Thebesii which are seldom seen They are the minute openings, probably arteries opening into the right auricle

The right ventricle is a large cavity within the heart and below the auricle The right auricle opens into it, and the pulmonary artery emerges from it In this cavity are to be noticed—

1 The muscular pillars or columns called carneæ columnæ, which cross one another in every direction and have deep grooves between them

2 The cordæ tendineæ, which connect some of the carneæ columnæ with the valves, and insert others into the parietes of the heart

3 The tricuspid, or triglochin valves, which arise from the tendinous circle around the opening of the auricle, into the ventricle and form three points, which are fastened by the cordæ tendineæ to the parietes of the right ventricle

4 The reticulated appearance of the carneæ columnæ, and the smooth surface leading to the artery

5 Three semilunar valves placed just within the pulmonary artery In the middle of each valve is a hard knot, called corpus sesamoideum aurantii

The left auricle is not so capacious as the right, it has no communication with it in a natural state, yet the foramen ovale, which is always open in the fetus sometimes remains so throughout life, or is forced open The four pulmonary veins open into this cavity It presents the fasciculated appearance of musculi pectinati, though not so strongly as the right auricle The opening of this auricle into the ventricle is less than that of the right auricle, but it is surrounded by a tendinous circle in the same way

The left ventricle is less than the right, its fleshy walls, or parietes, are much stronger and it has, like the right, an opening from the auricle, and an artery arising from it In this ventricle we observe—

1 The valve arising from the circle of the auricular opening, which terminates in two fasciculi of tendons, and hence is called, from its resemblance to a bishop's mitre valvulæ mitrales The two points are connected to the carneæ columnæ

2 The carneæ columnæ are here remarkably strong and rounded and the cordæ tendineæ very firm

3 The smooth surface towards the arterial opening

4 The semilunar valves, just within the artery, or aorta, with the corpora sesamoidea in their middle

From this description of the heart, it appears that the auricles are separated from each other, and also the ventricles The partition between the auricles is thin and partly membranous but that between the ventricles is about half an inch in thickness, and composed of strong fleshy fibres The former is termed septum auricularum, the latter septum ventriculorum

The structure of the heart is entirely muscular and well supplied with vessels, its cavities are lined by a smooth and very irritable membrane, continued from the internal coat of the arteries and veins, and its external surface is covered by a reflection of the internal tunic of the pericardium

Abdomen

The cavity thus denominated is situated between the thorax and pelvis, and is divided into several regions The external parts are the common integuments, five pairs of abdominal muscles, and the peritoneum The internal parts or viscera more properly so called are the omentum stomach, small and large intestines, liver, gall-bladder, mesentery, lacteal vessels spleen, pancreas kidneys, supra renal glands, part of the aorta descendens, and vena cava ascendens

The peritoneum is a smooth, delicate membrane lining the internal surface of the abdomen, and covering all its viscera

It is connected, by means of cellular membrane, with the diaphragm, abdominal muscles vertebræ of the loins, bones of the pelvis, urinary bladder, uterus, intestinum rectum, and all the viscera of the abdomen Its use is to contain and strengthen the abdominal viscera, and to exhale a vapour to lubricate them

The omentum, or epiploon, is an adipose membrane, a production of the peritoneum attached to the stomach, and lying on the anterior surface of the intestines

It is divided into large and small. The former hangs pendulous from the great curvature of the stomach The small omentum fills up the space between the small curvature of the stomach and liver

Immediately behind the biliary ducts there is an opening in the omentum, which will admit the finger, called the foramen of Winslow The foramen serves to lubricate the intestines, and to preserve them from concretion

The stomach is a membranous receptacle, situated in the epigastric region which receives the ingesta from the œsophagus It is divided, when empty, into an interior and a posterior surface, a great and little curvature, the cardia, or superior opening, and the pylorus, or inferior opening It is connected with the œsophagus, duodenum, omentum and pancreas, and is composed of three membranes or coats, viz a peritoneal muscular, and villous coat Its use is to receive the ingesta from the œsophagus, and to retain, mix, digest, and expel it into the duodenum

The intestines are a membranous tube, six times longer than the body in the cavity of the abdomen, variously contorted from the pylorus of the stomach to the anus They are divided into small and large The small are,

1st The duodenum, which begins at the pylorus of the stomach and is reflected over the spine under the peritonenm It is about twelve fingers breadth in length, and has an oblique perforation near its middle, which is the common opening of the pancreatic duct and ductus communis choledochus

2d The jejunum and ileum compose the remainder of the small intestines These intestines always hang from the mesentery, the greater part of them into the cavity of the pelvis There is no material alteration of structure in any part of them the termination of the one and beginning of the other is imaginary The jejunum constitutes the first half from the duodenum, the other half is ileum The small intestines have internally a number of annular folds which augment the surface for the situation of the lacteal and other vessels, these are called valvulæ conniventes and are peculiar to the small intestines; they are most numerous in the duodenum, and least so in the ileum

The large intestines are distinguished into,

1st. The cæcum, which lies upon the right hip over the iliacus internus muscle, to which it is attached by cellular membrane it is a large cul de sac the small intestine opens obliquely into it, in such a manner as to form a valve to impede the return of the fæces and nearly opposite to this valve, there arises from the cæcum a small vermiform canal, imperforated at its extremity, called the appendicula cæci vermiformis

2d. The ascending portion of the large intestine is the colon, it proceeds towards the liver by the name of the ascending portion of the colon, and having reached the liver, forms a transverse arch across to the other side. The colon then descends, forming what is termed its sigmoid flexure into the pelvis, where the gut is called

3d The rectum, which terminates in the anus The large intestines are lobulated, have sometimes little fat portions adhering to them called appendiculæ epiploicæ, and also three longitudinal bands upon their external surface.

The intestines are composed of three membranes, or coats, a peritoneal, a muscular, and a villous. They are connected with the mesentery, kidnies, os coccygis, and urinary bladder, and in women with the vagina

The lacteal vessels arise from the small intestines, and run into the mesenteric glands The use of the intestines is to receive the chyme, and retain it for a time, to mix it with the enteric juice and bile, to separate and propel the chyle into the lacteal vessels, and to eliminate the feces.

The mesentery is a membranous production, formed of two laminæ of peritonæum, between which are a quantity of cellular or adipose membrane, numerous glands, lacteals, lymphatics, arteries, veins, and nerves It is distinguished into mesentery, which adheres to the three superior lumbar vertebræ, and has the small intestines hanging to it, mesocolon, which supports the colon and mesorectum, a portion in the pelvis, enclosing the rectum

The liver is the largest of all the abdominal viscera, it is of a deep red colour, and situated in the right hypochondriac region, and somewhat in the epigastric, hanging by its ligaments from the diaphragm It is convex above and concave below, superiorly extremely broad but gradually becoming thinner inferiorly, and ending in a thin margin Its surfaces are smooth, being covered by the peritoneum, which forms its several ligaments viz two which are attached to the diaphragm and are termed lateral, in the middle of its lower and anterior margin is a round ligament adhering to the navel, through which the umbilical vein, &c of the fœtus passed between the round ligament and the diaphragm is another called the suspensory ligament, which adheres to the peritoneum of the anterior part of the abdomen It is divided into three lobes, one of which is very large, the other smaller, and a third very small and called, after its describer Spigelian, or lobulus Spigelii The liver is a gland composed of arteries, veins nerves, lymphatics, and excretory ducts, united together by a particular substance there is also an appendage on the concave surface of the liver called the gall bladder

The gall bladder is an oblong membranous receptacle, situated under the liver, to which it adheres very firmly, in the right hypochondrium, It is divided into bottom body, and neck, which terminates in the ductus cysticus This last arises from the gall bladder, proceeds towards the duodenum and unites with the ductus hepaticus, to form the ductus communis choledochus which perforates the duodenum, and conveys the bile into the intestine The gall bladder is composed of three membranes, a common, fibrous or muscular, and villous Its use is to retain the gall, which regurgitates from the hepatic duct, there to become thicker, more bitter and acrid, and to expel it, when wanted, into the duodenum

The spleen is a spongy, somewhat oblong viscus, of a bluish red colour, situated in the left hypochondrium, near the fundus of the stomach, under the ribs Its use is not known

The pancreas is a glandular body, of a long figure, resembling a dog's tongue, situated in the epigastric region, under the stomach It is composed of innumerable small glands, the excretory ducts of which unite and form the pancreatic duct

The pancreatic duct perforates the duodenum with the ductus communis choledochus, and conveys its secretion into the intestines This secretion resembling saliva is carried into the duodenum

The lacteals are absorbent vessels of the mesentery which convey the chyle, a milk like fluid, from the intestines into the thoracic duct They originate from the surface of the duodenum, jejunum, and ileum, and terminate in the thoracic duct, or trunk of the absorbents, which runs near the aorta on the spine, and empties its contents into the jugular vein As they run through the mesentery, they pass through a number of glands, in which the chyle is altered, and then proceed to their trunk

The kidneys are two somewhat oval viscera, situated behind the sac of the peritoneum, near the bodies of the superior lumbar vertebræ, which secrete the urine They are divided into three kinds of substances a cortical, which is external and very vascular, a papillous, which ends in several papillæ or nipples in the pelvis, a tubular, which goes from the cortical to the papillous substance and into a hollow part called the pelvis, lined by a smooth membrane, termed the pelvis of the ureter which ends in the ureter Their integuments are an adipose membrane, and a membrana propria They secrete the urine and convey it to the bladder

The renal capsules, or renal glands, are two triangular flat bodies, situated one above each kidney They are covered by a proper membrane, and anteriorly by the peritoneum In a healthy state they have a small cavity in which there is a brownish fluid No excretory duct has yet been detected, nor is their use known

The pelvis is a cavity below the abdomen, and under the pubes, containing the urinary bladder, rectum and organs of generation

The vesica urinaria, or urinary bladder, is a membranous sac in the pelvis without the peritoneum, which in part gives it a coat or tunic It is situated in men between the pubes and rectum, in women between the pubes and uterus, being fixed at its anterior and inferior part to the arch of the pubes by its neck and the urethra It is divided into a fundus which is loose in the abdomen, and, when the bladder is distended reaches the navel and even the stomach, a neck before which the prostate gland is placed in men, and a body or that part composing the chief bulk of the bladder distinguished by an anterior and posterior part and sides The anterior half of this dilatable base is connected inferiorly in men to the rectum, and in women to the uterus its middle part to the bones of the pelvis by means of cellular membrane and muscular fibres and its superior part is attached loosely to the muscles of the abdomen

It is composed of three membranes like the intestines, a peritoneal, a muscular coat, and a villous Its use is to receive, retain, and expel the urine brought into it by the ureters, which perforate its inferior part near the neck of the bladder

The male organs of generation are, the penis, testicles, and vesiculæ seminales

The penis called also membrum virile, is that cylindrical part which hangs down under the mons Veneris, before the scrotum It is divided into root, body, and head, called glans The hairy prominence which covers the pubes is called mons Veneris The penis consists of common integuments, two corpora cavernosa, the corpus spongiosum urethræ, and the urethra

1st The corpora cavernosa, which form the chief bulk of the penis, are composed of a cellular and very elastic substance, and arise by two crura, one from each ascending ramus of the ischium. At their origin they are firmly attached to the bone by a dense cellular membrane, they then converge towards the pubis, where they are also firmly connected to the symphysis by a dense cellular membrane About this place they meet their elastic ligamentous substance together, and in consequence of several perforations in this ligamentum pectinatum adhere, while there is a free communication between the cells of one corpus cavernosum and those of the other thus adhering together, they form the greater part of the penis, and end abruptly behind the corona glandis The corpora cavernosa, being each somewhat round, and lying together in the penis a considerable excavation is left above and below, in the former the great vein of the penis passes, and in the latter the corpus spongiosum urethræ

2d The corpus spongiosum begins before the prostate gland, and surrounds the urethra At its beginning it forms the bulbous part of the urethra, and then proceeds forwards in the space between the two corpora cavernosa on the under surface, and is expanded at the extremity of the penis into a very vascular substance, called glans penis, naturally covered by a fold of the skin, called the prepuce, which, at the under part of the glans, is fixed to it by a frænum

3d The urethra is a membranous canal which proceeds from the bladder, through the prostate gland and the corpus spongiosum urethræ, and at the end of the glans penis its internal membrane is reflected over the glans, forming the meatus or opening in the glans The urethra is endowed with a high degree of sensibility and contractility

In the urethra are to be observed,

1st The verumontanum, or caput gallinaginis, a cutaneous eminence in the urethra, about an inch before the neck of the bladder

2d The openings of the ejaculatory ducts around the caput gallinaginis.

3d The opening of the ducts of the prostate and Cowper's glands

4th The lacunæ or openings of the ducts of the mucous glands of the urethra

The lymphatics of this organ are deep-seated and superficial The superficial arise from the prepuce in three divisions one on the right side of the frænum, another on the left, and a third directly on the middle of the superior side Those from the under side make a semicircular turn from the under to the upper side of the penis, whilst that on the superior side of the prepuce runs on the middle of the back of the penis, exactly in the direction of the symphysis pubis. At a little distance from the pubes the three divisions unite into one common trunk, which almost immediately separates again into two, one, going to the right groin, accompanies the veins going to the inguinal vein, and terminates near it in those inguinal glands which are nearest the symphysis pubis. The other trunk goes to the left groin, and terminates exactly in the same manner as the former The deep seated lymphatics accompany the arteries, and pass with them on the inside of the tuberosities of the ischia, or under the angle of the pubes The use of the penis is for erection, coition, effusion of semen, and of urine

The testes, or testicles, are two oval bodies, situated originally within the cavity of the abdomen, from which they descend before birth, or soon after, into a bag, called the scrotum, placed under the root of the penis. The adult testicle is

composed of arteries, veins, and a peculiar set of vessels, which arise from the minute termination of the arteries This peculiar set of vessels are—

1 The vasa recta, which are found in the substance of the testicle, arising from the minute ramifications of the spermatic arteries. At the top of the testicle the straight vessels, which are the commencement of the excretory ducts, just as the biliary pores are of the ductus hepaticus, inosculate with one another, and form,

2 The rete vasculosum testis This plexus of vessels sends off at the superior part of the testicle,

3 The vasa efferentia, which are ten or more in number They pass from the body of the testicle, and soon uniting into one trunk, called vas deferens, form, by an immense number of convolutions, a somewhat hard substance, called the

Epididymis, which is pyramidal, has a thin convex head, and a flat thin extremity, it is formed merely of a convolution of the vas deferens, or excretory duct of the testicle.

The vas deferens is a long but small duct, formed of a cartilaginous substance, its cavity is not sufficiently large to admit a pin It passes upwards from the end of the epididymis in a zig-zag manner by the side of the pubes, where it is no longer convoluted, but proceeds straight into the cavity of the pelvis to the vesiculæ seminales

The testicle has a strong, white, dense tunic, intimately connected to it, this is called the tunica albuginea testis It completely encompasses the body of the testicle and is extended over the epididymis It has also a tunic called vaginalis. Anatomist consider this as as a production of the peritoneum, but the opinion does not appear to be well founded It is a delicate membranous bag, connected externally by cellular structure to the dartos, and the testicle, with its tunica propria or albuginea, adheres firmly to its outside, pushin itself, as it were, into it, in the same way as the heart into the pericardium, the lungs into the pleura, &c so that, when the tunica vaginalis is opened, the testicle is seen within it The dartos is a condensation of cellular membrane lining the scrotum, with the cutis of which it is closely connected It admits of corrugation and relaxation, and has generally but erroneously been described as a muscle The scrotum consists of elastic cellular membrane and common integuments

The vesiculæ seminales are two whitish membranous receptacles, situated on the back part of the bladder, close to its neck, which are said to receive and contain the semen from the vasa deferentia; but the fluid does not appear to be the same as that secreted by the testes Their substance is membranous, and resembles an intestine variously contorted, and covered with a fibrous substance. Each vesicula sends forth a duct, which passes through the prostate gland, and is called ejaculatory; they are some lines long, and enter the cavity of the urethra by a peculiar orifice at the top of the verumontanum

The parts which serve for generation in women are divided into external and internal

The external parts are—

1. The mons veneris. The prominent portion of integuments immediately over the ossa pubis It is formed by a quantity of fat under the skin, and, after puberty, is covered with short hairs

2 The labia majora Two external lips, of a soft consistence, and formed of very vascular common integuments They begin from the symphysis pubis, are covered externally with hair, but their internal surface is smooth, and lubricated with the smegma of the odoriferous glands

3 The clitoris A small substance, placed just below the origin of, and within, the labia majora. It resembles a penis in miniature, and, like it, is formed of two spongy substances, which arise by two crura from the ascending ramus of the ischium The clitoris is also, like the natural penis, covered with a foreskin. Durin[illegible]tion, it is the principal seat of pleasure, and [illegible]istended and erected by the venereal stimulus

4 The labia minora, or nymphæ These are the two inner folds, placed at the commencement of the vagina, they begin from the foreskin of the clitoris, enlarging as they pass downwards, and terminate in the under part of the beginning of the vagina Their structure is highly vascular and sensible, and they have a number of sebaceous glands to lubricate them Their use appears to be, to assist in creating the venereal pleasure, and to direct the urine flowing against them out of the urethra, in such a manner as to prevent it from wetting the thighs

5 The meatus urinarius. A small triangular opening, situated immediately under the clitoris, behind the nymphæ, and beset with mucous glands.

6 The hymen, seldom met with but in children, in whom it is mostly a semilunar membrane, situated at the entrance of the vagina, behind the meatus urinarius When once lacerated it forms several fleshy excrescences, which are called carunculæ myrtiformes

The internal parts of generation are the vagina uterus, Fallopian tubes, ovaria, broad and round ligaments of the uterus, and the urethra

The vagina is an elastic membranous canal leading from the nymphæ upwards, under the arch of the pubes, between the bladder and rectum, and terminating at the neck of the uterus, which it embraces

It is composed of three membranes

1 An epidermis, which enters from without

2 A white, thick, elastic membrane which, in the virgin vagina, forms an immense number of transverse rugæ, or folds

3 A cellular coat, which is external, and connects it to neighbouring parts and on which an immense number of arteries are distributed

Besides these coats the vagina has also, especially at its anterior part, a number of muscular fibres, which surround it like a sphincter In the vagina we find

1 A number of lacunæ, which excrete its mucus

2 In virgins, the hymen, and where this has been once ruptured, the carunculæ myrtiformes, or remains of the hymen

3 The meatus urinarius, immediately under the symphysis pubis, behind the clitoris

4 The vaginal portion of the uterus, or os uteri

The vagina embraces the penis in coition, and, by its muscular fibres at its origin, and its elastic membranous substance, accommodates itself to the size of that organ The catamenia pass from the uterus through the vagina, as does also the fetus in labour

The uterus, or womb, is a spongy hollow receptacle, somewhat like a flattened pear, situated in the pelvis between the urinary bladder and rectum It is divided into the vaginal portion, the neck, the body, the fundus, and its appendages

The vaginal portion is called the os uteri, and, from its resemblance to the mouth of a tench fish, os tincæ, midwives usually term it os internum, giving the name of os externum to the orifice of the vagina In virgins it is much less than in those who have borne children, it consists of two labia, and an opening between, which leads to the cavity of the uterus. In the internal surface of the os uteri are situated a number of folds, and occasionally several small vesicles, and a quantity of transparent gelatinous mucus

The neck of the uterus is also hollow, and contains several plicæ or folds In some uteri it is longer than in others; its cavity leads to the uterine body Children and virgins have the uterus more flattened than others, it is somewhat of a triangular shape, having its appendages going from each superior angle, whilst the body gradually diminishes towards the os uteri The cavity in the body of the uterus is also triangular it commences at the os uteri, is nearly of the same diameter all along the neck of the uterus, and enlarges in the body At each superior angle, the cavity of the uterus receives that of the Fallopian tube The uterus is lined by a smooth vascular membrane, whose vessels secrete the menstrual blood The portion of the uterus which hangs into the cavity of the pelvis is covered by the peritoneum, whilst the vaginal portion receives a tunic from the epidermis continued from the vagina The body of the uterus is composed of peculiar fibres, blood vessels, absorbents, and nerves These fibres do not appear in an unimpregnated uterus to be of the same nature as those of the impregnated uterus

The appendages to the uterus are the round and broad ligaments, the Fallopian tubes, and the ovaries

1 The round ligaments are two vascular ligaments, about the size of a goose quill, which arise one from each side of the uterus, near its fundus, and somewhat on its anterior surface, and proceed obliquely outwards and downwards to the ring of the external oblique muscle, which they pass through, and are lost in the fat about the labia majora

2 The Fallopian tubes are also termed uterine tubes they go one from each superior angle of the uterus directly across the pelvis, for the space of four inches, covered by the peritoneum, and terminate by a fringed body, the fimbriæ, which float in the cavity of the pelvis The substance of the Fallopian tube is of a muscular nature, by which means it has a peristaltic motion In the middle of the fimbriæ is the opening of the tube, so that if air were blown into the cavity of the vagina, it would pass into the cavity of the uterus, then along the Fallopian tubes into the cavity of the abdomen

3 The broad ligaments consist of a duplicature of the peritoneum passing over the tubes and ovaria, and going in form of a broad expansion to the sides of the pelvis, so that the peritoneum of the upper and under surfaces of the uterus meeting at the sides, goes across the pelvis to its side, forming what is called the broad ligaments in this passage it envelopes the tubes, ovaria, and blood-vessels

4 The ovaria are two oblong and rather flattened bodies, hanging in the duplicature of the peritoneum, at the sides of the uterus about two inches from it, and behind the broad ligaments Under the peritoneal coat of the ovarium is its proper substance, which is subcartilaginous. An adult virgin ovarium contains a number of highly vascular vesicles, filled with a transparent fluid, said to be ovula, and first accurately described by De Graaf Besides these vesicles, there are occasionally two or more blackish spots called corpora lutea, they were supposed to be a certain criterion of the woman's having borne a child, but this is erroneous, for corpora lutea exist in virgins nor is it certain that the vesicles are ovula The uterus and its appendages are for the purposes of generation, and the perfection of the young

The involucres of the viscera, or splanchnic organs, we may also divide into external and internal

The internal consist of the membrana adiposa, cutis, and rete mucosum

1 The membrana adiposa, cellulosa, or reticularis is composed of laminæ and fibrous texture, so arranged as to form cells and a web like structure It is found in almost every part of the body, the extremities as well as the trunk, connecting part with part, which is well exemplified by the fact of butchers' blowing up their veal It is extremely vascular, and in some parts it separates oil from the blood, in consequence of which it is rendered adipose

2 The cutis, dermis, or true skin, is an elastic, sensible, extremely porous, and thick membrane, situated between the rete mucosum and adipose membrane, covering the whole body It is composed of a fibrous, vascular, and nervous structure Its external surface is covered by the rete mucosum, and immediately over it is the cuticle it is here that a vast number of nervous fibrils, called papillæ, are every where projecting from its surface to constitute the organ of touch these are of various forms, and are most exquisitely sensible on the lips, finger-ends, &c The use of the skin is to cover the whole body, and afford a situation for the organs of touch, exhalation, and inhalation

The rete mucosum, mucus Malpighianus, rete Malpighianum, corpus mucosum, corpus reticulare, is a mucous substance, said to be disposed in a net-like form, between the epidermis and cutis The difference of colour in mankind depends on this substance in Europeans it is white, in Ethiopians, black, &c. There is great variety in the thickness and transparency of the rete mucosum, in the lips, mouth, over the glans penis, nymphæ, vagina, &c. It is transparent and very delicate It is thickest in the scrotum

The external involucres consist of the epidermis, ungues, pili

1 The epidermis, cuticula, or scarf-skin, is a thin, insensible, pellucid membrane, which covers the whole external surface of the body. It is perforated by the hairs, inhaling and exhaling vessels Its outer surface is dry and horny, and marked with various lines in which perforations are evident Its internal surface is moist and shaggy, and connected to the cutis by the rete mucosum, which lies between them and the vessels and the hairs

The epidermis is often reduplicated as in the interior parts of the nose, mouth, arms, vagina, urethra, &c Its thickness varies in different parts, and its colour is naturally white.

The ungues, or nails, are horny laminæ, situated in the extremities of the fingers and toes Their use is to defend the nervous papillæ from contusion.

The pili, or hairs, are thin, elastic, dry filaments, growing out of the skin. Their colour and situation is various as is also their names. On the head they are termed capilli, above the eyes supercilia; on the margin of the eyes, constituting the eye-lashes, cilia, in the nostrils vibrissæ, pili auriculares in the meatus auditorius, mystrix on the upper lip, barba on the lower jaw. See plates from X to XIX inclusive

ANATOMY (Comparative), Zootomy. The dissection of brutes, fishes, polypi, &c to illustrate, or compare them with, the structure and functions of the human body. See COMPARATIVE ANATOMY

ANATRON (*Natron*, Arab. The name of a lake in Egypt where it was first observed) Soda, natron, or mineral alkali

ANATIOM, an island among the New Hebrides, in the South Sea Lat 20 10 S Lon 170 9 E.

ANAUMACHION, in antiquity, the refusing to serve in the fleet.

ANAXAGORAS, one of the most celebrated philosophers among the ancients He was born at Clazomene in Ionia, about the 70th Olympiad He was a disciple of Anaximenes, and he gave up his patrimony, to be more at leisure for the study of philosophy, giving lectures in that science at Athens Being persecuted in this place, and at last banished from it, he opened a school at Lampsacum, where he was greatly honoured during his life, and still more after his death, statues having been erected to his memory. It is said he made some predictions relative to the phænomena of nature, as earthquakes, &c. upon which he wrote some treatises His principal tenets may be reduced to the following:—All things were in the beginning confusedly mixed together, without order and without motion The principle of things is at the same time one and multiplex, which had the name of homœmeries, or similar particles, deprived of life. But there is beside this, from all eternity, another principle, an infinite and incorporeal spirit, who gave motion to these particles; in virtue of which, such as are homogeneal united, and such as were heterogeneal separated according to their different kinds. All things being thus put into motion by the spirit, and every thing being united to such as are similar, those that had a circular motion [illegible] bodies, the lighter particles [illegible] those that were heavier de[illegible] of the earth, being drawn [illegible] force of the air, took fire, [illegible] beneath which the sun and [illegible]

ANAXAGORIA, a festival anciently observed in honour of Anaxagoras.

ANAXARCHUS, a philosopher of Abdera, [illegible], and the [illegible] monarch [illegible] wounded in a [illegible] the philosopher [illegible] to the place [illegible] and not the blood of a [illegible] of Anaxarchus [illegible] Nicocreon, at [illegible]ander's table, and the tyrant, in revenge, seized the philosopher, and pounded him in a stone mortar with iron hammers. He bore this with much resignation, and exclaimed, "Pound the body of Anaxarchus, for thou dost not pound his soul." Upon this, Nicocreon threatened to cut his tongue, and Anaxarchus cut it off with his teeth, and spat it out into the tyrant's face.

ANAXIMANDER, a philosopher of Miletus, the disciple and successor of Thales He had a considerable knowledge of astronomy and geography, and was the first who noticed the obliquity of the ecliptic; he taught that the moon receives her light from the sun, and that the earth is globular to him is ascribed the invention of the sphere, the gnomon, and geographical charts He likewise discovered that the obliquity of the ecliptic was measured by about 1-15th of a great circle, or nearly 24 degrees He lived in the year 545 B.C.

ANAXIMENES, the pupil and successor of the above, maintained that air was the first principle of all things Pliny says, that he invented the sun-dial He flourished in the 4th century B C ; so that Pliny's testimony must be erroneous, respecting the invention of sundials, that of Ahaz being in existence at least 700 years before the Christian era

ANBERTKEND, in the eastern language, a celebrated book of the Brachmans, wherein the Indian philosophy and religion are contained. The word in its literal sense denotes the cistern wherein is the water of life The Anbertkend is divided into fifty beths or discourses, each of which consists of ten chapters It has been translated from the original Indian into Arabic, under the title of Morat al Maani, q d "the marrow of intelligence "

ANCEPS CAULIS, in botany, (an ancipital stem) Angulis duobus oppositis acutiusculus Two-edged or double-edged Flatted, and rather sharp with two opposite angles This is the common form of the ancipital stem, but it may have more angles than two; for Linnæus gives not only digonus (caulis) but trigonus, tetragonus, pentagonus, and polygonus, as species of the anceps. There is also an ancipital leaf, having two prominent longitudinal angles, with a convex disk, as in sisyrinchium.

ANCESTORS, progenitors; or those from whom a person is descended; exclusive of his immediate parents. The word is derived from the Latin ancessor, written, by contraction, for antecessor, q. d. goer before. Most nations have paid honours to their ancestors. It was properly the departed souls of their fore-fathers that the Romans worshipped under the denominations of lares, lemures, and household gods. Hence the ancient tombs were a kind of temples, or rather altars, wherein oblations were made by the kindred of the deceased The law distinguishes between ancestor and predecessor; the former being applied to a natural person, as such an one and his ancestor, and the latter to a body politic or corporate, as a bishop and his predecessors.

ANCESTRAL, a. (from ancestor). Claimed from ancestors (*Hale*).

ANCESTRY s (from *ancestor*) 1 Lineage; a series of ancestors (*Pope*). 2 The honour of descent; birth (*Addison*).

ANCHENTRY s. (from *ancient*) Antiquity of a family. properly *ancientry* (*Shak*)

ANCHILOPS See ANCHYLOPS.

ANCHISES, in fabulous history, was a Trojan pri[illegible] son of Capys he was so agreeable in the [illegible] Venus, that she offered herself to him in the form of a beautiful young woman, desiring him to present her to his relations, in order to have their marriage speedily solemnized; but he telling her, that nothing should prevent his enjoying her on the spot, she took him at his word Venus told him that she should bear him a son, who should be called Æneas; but told him that if he ever boasted of the favour she had granted him, he would be thunder-struck by Jupiter. Some time after, when he was drinking with his friends the secret escaped him; on which it is said that he was struck by thunder, and that this occasioned the loss of his sight

ANCHOR, ANCHORA, an instrument at sea, and in rivers, to retain and fasten a vessel by The word comes from the Latin ancora, or anchora, of the Greek ἀγκυρα, which comes from ἀγκυλος, *incurvus*, crooked

The anchors now made are contrived so as to sink into the ground as soon as they reach it, and to hold a great strain before they can be loosened or dislodged from their station They are composed of a shank, a stock, a ring, and two arms with their flukes The stock, which is a long piece of timber fixed across the shank, serves to guide the flukes in a direction perpendicular to the surface of the ground, so that one of them sinks into it by its own weight as soon as it falls, and is still preserved steadily in that position by the stock, which, together with the shank, lies flat on the bottom In this situation it must necessarily sustain a great effort before it can be dragged through the earth horizontally Indeed this can only be effected by the violence of the wind or tide, or both of them, sometimes increased by the turbulence of the sea, and acting upon the ship so as to stretch the cable to its utmost tension, which accordingly may dislodge the anchor from its bed, especially if the ground be soft and oozy, or rocky When the anchor is thus displaced, it is said, in the sea-phrase, to come home.

Every ship ought to have three principal anchors, viz the sheet, maitre-ancre, (which is the anchora sacra of the ancients), the best bower, second ancre; and small bower, ancre d'affourche, so called from their usual situation on the ship's bows. There are besides smaller anchors, for removing a ship from place to place in a harbour or river, where there may not be room or wind for sailing; these are the stream-anchor, ancre de touée; the kedge and grappling, grapin this last, however, is chiefly designed for boats.

In England, France, and Holland, anchors are made of forged iron, or rather of a number of small rods of very tough metal, but in Spain they are sometimes made of copper, and likewise in several parts of the South Sea M Bouguer, in his Traité de Navire, gives the following dimensions of the several parts of an anchor. The two arms generally form the arch of a circle, whose centre is three eighths of the shank from the vertex, or point where it is fixed to the shank; and each arm is equal to the same length, or the radius, so that the two arms together make an arch of 120 degrees the flukes are half the length of the arms, and their breadth two-fifths of the said length With respect to the thickness, the circumference at the throat, or vertex of the shank, is generally made about a fifth part of its length, and the small end two-thirds of the throat, the small end of the arms of the flukes, three-fourths of the circumference of the shank at the throat These dimensions should be bigger when the iron is of a bad quality, especially if cast iron be used instead of forged iron

An improvement in the construction of anchors has been proposed by Mr James Stuard, of the parish of St Anne, Middlesex, who obtained a patent for his invention, dated Feb 9, 1796

The whole of this invention consists in making the anchor with one fluke or arm instead of two, and contriving to load that fluke or arm in such a manner as to make it always fall the right way With this view Mr Stuard would have the shank of the anchor made very short, that it may cant the more when suspended by the cable; and he would have the arm and it made of bars in one length, that there may be no shoot or joining in the whole instrument The bend of the shank and arm he would have rounded, and not angular as in the common anchor; and on this bend he would have a small shackle, or two plates with a small bolt between them, for the buoy-rope to be made fast to Instead of wood, he proposes for the stock of the anchor a bar of wrought iron, loaded or covered at the ends with knobs of cast iron, and he would have the palm of the fluke or arm either to be composed entirely of cast iron, or to be a cast iron shell filled with lead This weight of the palm, the shortness of the shank, and the structure of the stock, will no doubt make the anchor fall the right way; which, having no upper fluke, will never be tripped by the cable taking hold of it on the ship's swinging, nor will it prove so dangerous as the common anchor to such vessels as may happen to ground by it.

The anchor is said to be apeek, when the cable is perpendicular between the hawse and the anchor An anchor is said to come home, when it cannot hold the ship. An anchor is foul, when by the turning of the ship, the cable is hitched about the fluke. To shoe an anchor, is to fit boards upon the flukes, that it may hold the better in soft ground. When the anchor hangs right up and down by the ship's side, it is said to be a cock bell, upon the ship's coming to an anchor.

Riding at Anchor, is the state of a vessel moored and fixed by her anchors

Dropping an Anchor, imports the letting it down into the sea In some cases it is necessary to drop two anchors opposite to each other, one to keep the ship firm against the tide or flow, the other against the ebb

Weighing Anchor, is the recovering it into the vessel in order for sailing The anchor is ordinarily weighed by means of a windlass

Anchor, in architecture, is a sort of carving, somewhat resembling an anchor It is commonly placed as part of the enrichments of the boultins of capitals of the Tuscan, Doric, and Ionic orders.

To A'nchor, *v n* (from the noun) 1 To cast anchor, to lie at anchor (*Pope*) 2 To stop at, to rest on (*Shaks*)

A'NCHORAGE. *s* (from *anchor*) 1 The hold of the anchor (*Wotton*) 2 The set of anchors belonging to a ship (*Shaks*)

A'NCHORED *particip a* (from *To anchor*) Held by the anchor (*Waller*)

ANCHORA'LIS PROCESSUS (*anchoralis*, from αγκων, the elbow) See Coracoid process

A'NCHOR-HOLD. *s* (from *anchor* and *hold*) The hold or fastness of the anchor, and, figuratively, security (*Camden*)

A'NCHOR-SMITH. *s* (from *anchor* and *smith*) The maker or forger of anchors

ANCHOVY, in ichthyology and commerce, a species of clupea, with the upper jaw longest (See Clupea) The anchovy is so like the common sprat, another species of clupea, that it is no wonder this fish is often pickled and sold under its name. The fishing for anchovies is carried on chiefly in the night-time, when a light being put on the stern of the vessels, the fishes flock round, and are caught in the nets

Anchovy pear. This fruit, the produce of the grias cauliflora of Linnéus, is eaten by the inhabitants of Jamaica, as a pleasant and refrigerant fruit. See Grias

ANCHUSA. Alkanet (*anchusa*, αγχουσα, from αγχειν, to strangle) From its supposed constringent quality, or, as others say, because it strangles serpents —A genus of the class and order pentandria monogynia Corol funnel-form, the throat closed with arched valves, [illegible] at the base It has thirteen species, [illegible] of which is common to our own [illegible] a. officinalis, or bugloss (See [illegible]) It is the a tinctoria, a [illegible] whose root imparts the fine [illegible] spirit of wine, oils, wax, [illegible]

[illegible] (*anchylomerisma*, [illegible], to bend) Sa- [illegible] a concretion or growing [illegible]

A'NCH[illegible]

ANCHYLO[illegible] [illegible], to bend [illegible]

A'NCIENT. *a* [illegible] 1 Old, not modern (*Cowley*) 2 Old, that has been of long duration (*Ral*) 3 Past, former (*Sh.*)

Ancient demesne, or demain, in law, is a tenure, whereby all manors belonging to the crown in William the Conqueror's and St Edward's time, were held

The numbers, names, &c hereof were entered by the Conqueror, in a book called Domesday Book, yet remaining in the Exchequer, so that such lands as [illegible] that book appeared to have belonged to the crown at that time are called ancient demesne

The tenants in ancient demesne are of two sorts, one who hold their lands frankly by charter the other by copy of court roll, or by the verge, at the will of the lord, according to the custom of the manor

The advantages of this tenure are, 1 That tenants holding by charter cannot be rightfully impleaded out of their manor, and, when they are, they may abate the writ, by pleading the tenure 2 They are free from toll for all things relating to their livelihood, and husbandry, nor can be impanelled on any inquest

A'ncient *s* 1 The flag or streamer of a ship 2 The bearer of a flag (*Shaks*)

A'NCIENTLY *ad* (from *ancient*) In old times (*Sidney*)

A'NCIENTNESS *s* (from *ancient*) Antiquity, existence from old times (*Dryden*)

A'NCIENTRY *s* (from *ancient*) The honour of ancient lineage (*Shaks*)

A'NCIENTS *s* Those that lived in old times opposed to the moderns (*Pope*)

ANCI'STRUM In botany, a genus of the class and order diandria monogynia Calyx four-leaved, coroless, stigma many-parted, drupe dry, hispid, one-celled There are three species, all of which are exotics

ANCLAM, a strong town of Upper Saxony, in Germany, remarkable for the excellent pastures in its vicinity Lat 53 52 N Lon 14 5 E

A'NCON (*ancon*, αγκων, from αγκαζομαι, *to embrace*, απο τυ αγκαζεσθαι ἑτερω οςεω το οςεον, *because the bones meeting, and there uniting, are folded one into another*) In anatomy, the elbow.

ANCONA, a marquisate and province in the pope's territories in Italy

Ancona, the capital of the district of the same name, in Italy It is the Picenum of the ancients The inhabitants trade in white wax, which trade is mostly engrossed by the Jews of this place, who amount to about 5000 Lat 43 38 N. Lon 13 35 E

ANCONES, in architecture, the corners or quoins of walls, cross-beams, or rafters Sometimes the word denotes corbels.

ANCONE'US (*anconeus*, sc *musculus*, from αγκων, the elbow) Anconeus minor of Winslow Anconeus vel cubitalis riolani of Douglas. A small triangular muscle situated on the back part of the elbow It arises from the ridge and from the external condyle of the humerus by a thick, strong, and short tendon from this it becomes fleshy, and after running about three inches obliquely backwards, it is inserted by its oblique fleshy fibres into the

back part or ridge of the ulna. Its use is to extend the fore arm.

ANCONEUS EXTERNUS. See TRICEPS EXTENSOR CUBITI.

ANCONEUS INTERNUS. See TRICEPS EXTENSOR CUBITI.

ANCONEUS MAJOR. See TRICEPS EXTENSOR CUBITI.

ANCONEUS MINOR. See ANCONEUS, and ANATOMY.

ANCONOID PROCESS (*processus anconoideus*, from αγκων, the elbow.) A process of the cubit. See ULNA.

ANCYLE, in antiquity, a shield that fell, as was pretended, from heaven, in the reign of Numa Pompilius, at which time, likewise, a voice was heard declaring that Rome should be mistress of the world as long as she should preserve this holy buckler.

ANCYLOBLEPHARON (αγκυλοβλεφαρον, from αγκυλη, *a hook*, and βλεφαρον, *an eyelid*.) A disease of the eye, by which the eyelids are closed together.

ANCYLOGLOSSUM (*ancyloglossum*, αγκυλογλωσσον, from αγκυλη, *a hook*, and γλωσσα, *the tongue*.) A contraction of the frænulum of the tongue. Tongue tiedness.

ANCYLOSIS (*ancylosis*, αγκυλωσις, from α κυλος, *crooked*.) Anchylosis. A contraction of the joints impeding their motion.

AND, *conj.* The particle by which sentences or terms are joined.

ANDABATÆ, in antiquity, gladiators who fought hoodwinked.

ANDALUSIA, a province of Spain, bounded on the south by the kingdom of Granada, on the west by Algarve and the sea, on the north by Estramadura, and on the east by the kingdom of Murcia. It is about 250 miles long, and 150 broad.

ANDALUSIA (New), a province of Terra Firma, in South America, whose boundaries cannot be well ascertained.

ANDAMAN, two islands so called in the gulf of Bengal, the Great and Little. The Great Andaman is about fifty leagues long and eight wide. The Little Andaman is about eight leagues in length, and five in breadth, the inhabitants are of a gentle harmless disposition, they eat no flesh, and employ themselves in cultivating their lands, and raise great plenty of rice and fruit, which they sell to European vessels, that pass that way. The Great Andaman lies in lon. 92 40 to 93 15. E. Greenwich, and lat. 11 29 to 13 55. N. The Little Andaman lies about ten leagues S. of the other.

ANDANTE, by the musicians of the present day, is used to imply a time somewhat slow, and a performance distinct and exact, gentle, tender, and soothing.

ANDANTINO, in music, gentle, tender, and somewhat slower than andante.

ANDELY, a town in the department of Eure, and late province of Normandy, in France. Lat. 49 20 N. Lon. 1 30 E.

ANDERO (St.), a sea-port town of Biscay, in Spain. Lat. 43 25 N. Lon. 4 30 W.

ANDERSON (Alexander), an eminent mathematician, was born at Aberdeen towards the end of the 16th century. Where he was educated, or under what masters, we have not learned, probably he studied the belles lettres and philosophy in the university of his native city, and, as was the practice in that age of all who could afford it, went afterwards abroad for the cultivation of other branches of science. But wherever he may have studied, his progress in science must have been rapid, for, early in the 17th century, we find him professor of mathematics in the university of Paris, where he published several ingenious works, and among others, 1. Supplementum Apollonii Redivivi, sive analysis problematis hactenus desiderati ad Apollonii Pergæi doctrinam περι νευσεων, a Marino Ghetaldo Patritio Ragusino hujusque, non ita pridem restitutam. In qua exhibetur mechanice æqualitatum tertii gradus sive solidarum, in quibus magnitudo omnino data, æquatur homogeneæ sub altero tantum coefficiente ignoto. Huic subnexa est variorum problematum practice, Paris, 1612, in 4to.—2. Αιτιολογια. Pro Zetetico Apolloniani problematis a se jam pridem edito in supplemento Apollonii Redivivi. Ad clarissimum et ornatissimum virum Marinum Ghetaldum Patritium Ragusinum. In qua ad ea quæ obiter nuliu perstrinxit Ghetaldus respondetur, et analytices clarius detegitur. Paris, 1615, in 4to.—3. Francisci Vietæ Fontenacensis de Æquationum Recognitione et Emendatione Tractatus duo, with a dedication, preface, and appendix, by himself. Paris, 1615, in 4to.—4. Vieta's Angulares Sectiones, to which he added demonstrations of his own. Our professor was cousin-german to Mr. David Anderson of Finshaugh, a gentleman who also possessed a singular turn for mathematical knowledge. This mathematical genius was hereditary in the family of the Andersons, and from them it seems to have been transmitted to their descendants of the name of Gregory, who have for so many generations been eminent in Scotland as professors either of mathematics, or, more lately, of the theory and practice of physic.

ANDERSON (George), an English mathematician, was born at Weston, in Buckinghamshire, in 1760. His parents were common peasants, and he was obliged to work as a day-labourer. His genius, however, overcame every difficulty, and he attained by himself a knowledge of the higher branches of the mathematics. His extraordinary acquirements and modesty recommended him to a worthy clergyman, who at his own expence sent him to a grammar-school, and next to New-college, Oxford, where he took the degree of M.A. He also entered into deacon's orders, but having no relish for a country curacy, he set out for London, and after waiting some months, obtained a place as clerk to the board of con

troul, under Mr. Dundass He attended with such assiduity to business, as to lay the foundation of a disorder which carried him off, April 30, 1796. He left a widow, who, in consideration of her husband's merits, obtained a pension. Mr Anderson published Arenarius, or a Treatise on Measuring the Sands, translated from the Greek of Archimedes, and a General View of the Variations which have taken place in the Affairs of the East-India Company, since the Conclusion of the War in India, in 1784 One of Mr Anderson's earliest friends was Mr Bonnycastle, of the Royal Military Academy, who always speaks of his talents and disposition in terms of the highest respect

ANDES, or CORDILLERAS, a great chain of mountains, which run almost the whole length of South America. They are the highest and most remarkable mountains in the world, for those within the torrid zone are always covered with snow; and in passing over the lower part of them, people are in danger of being starved with cold. There are a great many volcanoes, which break out sometimes in one place, and sometimes in another, and by melting the snow, occasion such a torrent of water, that numbers of men and cattle have perished

ANDES, a hamlet of Mantua, in Italy, the birth-place of Virgil.

ANDIRON s. The iron at the end of a fire-grate in which the spit turns.

ANDOVER, a borough in Hampshire, with a market on Saturday. It sends two members to parliament. Lat. 51. 14 N Lon 1 20 W.

ANDRACHNE. Bastard orpine A genus of the class and order monoecia gynandria. Male calyx five-leaved; corol five-petalled; stamens five, on the rudiment of a style Female calyx five-leaved; corolless, styles three; capsule three-celled; seeds in pairs. There are three exotic species, Italy, India, Campeachy, furnishing one each.

ANDRACHNE In botany. See ARBUTUS

ANDRÆA. In botany, a genus of the class and order cryptogamia musci Capsule very short, [illegible], fringe simple, of four incurved, concave teeth, united at their tips, and [illegible] lid and veil. There are two [illegible]s, both common to our own [illegible]

[illegible]US, in ancient writers, [illegible] slaves. Hence also [illegible] slaves, more particu[illegible] men or children to [illegible] the Thessalians were [illegible] the dealers in slaves were called [illegible]

ANDRENA [illegible] Fabricius See Apis.

ANDREW (St.) [illegible] Christ, was born at Bethsaida [illegible] with his brother Peter followed [illegible] of a fisherman, till called by [illegible] seems that Andrew was the first disciple of Christ. He is said to have preached the gospel in Scythia, and to have been crucified on a cross shaped like the letter X, but his being thus crucified has not, as we find, any foundation in ancient records.

ANDREWS (Lancelot), an English divine, was the son of a mariner who was master of the Trinity House; and was born in London, in 1565 He was educated first at the Coopers' free-school at Radcliffe, from whence he was removed to Merchant Taylors' school, and was sent on an exhibition to Pembroke-hall, Cambridge; where having taken his degrees in arts, he applied himself to divinity Sir Francis Walsingham obtained for him the living of St Giles, Cripplegate, and afterwards a prebend and residentiaryship of St. Paul's On the death of Mr. Fulke he was chosen master of Pembroke-hall, to which he was a great benefactor He was also appointed one of the chaplains to queen Elizabeth, who greatly admired his preaching King James I employed him to defend the sovereignty of kings against Bellarmine, who had lately attacked it under the name of Matthew Tortus Dr Andrews did this with much spirit, in a piece called Tortura Torti, &c for which the king gave him the bishopric of Chichester in 1603, at the same time making him his almoner In 1609 he was translated to Ely, and appointed one of the privy council for England, and also for Scotland Nine years afterwards he was removed to Winchester, and made dean of the king's chapel The following anecdote of bishop Andrews will shew him to great advantage Waller the poet was one day at court, while king James was at dinner, who was attended by the bishop of Winchester, and Neale, bishop of Durham His majesty said to the prelates, "My lords, cannot I take my subjects' money when I want it, without all this formality in parliament?" Bishop Neale quickly replied, "God forbid, sir, but you should, you are the breath of our nostrils" On which the king said to the bishop of Winchester, "Well, my lord, and what say you?" "Sir," replied Andrews, "I have no skill to judge of parliamentary cases" The king answered, "No puts off, my lord, answer me presently" "Then sir," said he, "I think it lawful for you to take my brother Neale's money, for he offers it." He died in 1626, and was buried in the church of St Saviour's, Southwark, where there is a monument to his memory He had a share in the present translation of the Bible A volume of his sermons was printed after his death, by bishops Laud and Buckeridge His private devotions and meditations in Greek were translated into English by Dr Stanhope (*Watkins.*)

ANDREW's (St.), a town of Fifeshire in Scotland, once the metropolis of the Pictish kingdom, lying in W. lon 2. 48 N. lat. 56. 18. St. Andrew's was formerly the see of an

archbishop. It is seated at the bottom of a bay, on the level top of a small hill, extending east and west, having an open prospect of the German Ocean. The university, which was founded by bishop Wardlaw, in 1411, once consisted of three colleges. It is governed by a chancellor, who is elected by the two principals, and the professors of both the colleges. The rector is the officer to whose superintendance are committed the privileges, discipline, and statutes of the university. Each college has a principal; that of St. Salvador has nine professors, and the new college has five professors. The commerce of St. Andrews is very inconsiderable.

ANDRIA, in Grecian antiquity, public entertainments, first instituted by Minos of Crete, and, after his example, appointed by Lycurgus at Sparta, at which a whole city or tribe assisted.

ANDRO'GYNAL. *a.* (from ἀνὴρ and γυνὴ.) Hermaphroditical; having two sexes.

ANDRO'GYNALLY. *ad.* (from *androgynal.*) With two sexes (*Brown*).

ANDRO'GYNUS. *s.* (See ANDROGYNAL.) A hermaphrodite.

ANDROGYNOUS, among astrologers, is applied to such of the planets as are sometimes hot and sometimes cold: as Mercury is reckoned androgynous, being hot and dry when near the Sun, cold and moist when near the Moon.

ANDRO'GYNOUS PLANT. (*planta androgyna*, from ἀνηρ and γυνη.) A plant bearing male and female flowers, on the same root, without any mixture of hermaphrodites. Such plants are to be found chiefly in the class monœcia.

ANDROGYNOUS FLOWERS, flowers having stamens or pistils only.

ANDROIDES, (from ανηρ, ανδρος, *man*, and ειδος, *form.*) A human figure, which, by certain springs or other movements, is capable of performing some of the natural motions of a living animal. The motions of the human body are more complicated, and consequently more difficult to be imitated, than those of any other creature: whence the construction of an androides, in such a manner as to imitate any of these actions with tolerable exactness, is justly supposed to indicate a greater skill in mechanics than any other piece of workmanship whatever.

A very remarkable figure of this kind appeared in Paris in the year 1738. It represented a flute-player, and was capable of performing many different pieces of music on the German flute, which, considering the difficulty of blowing that instrument, the different contractions of the lips necessary to produce the distinctions between the high and low notes, and the complicated motions of the fingers, must appear truly wonderful.—This machine was the invention of M. Vaucanson, member of the Royal Academy of Sciences; and a particular description of it was published in the Memoirs of the Academy for that year.

The figure, which was about five feet and a half high, was placed upon a square pedestal four feet and a half high, and three and a half broad. The air entered the body by three separate pipes, into which it was conveyed by nine pairs of bellows, which expanded and contracted, in regular succession, by means of a steel axis turned by clock-work. These bellows performed their functions without any noise, which might have discovered the means of conveying the air to the machine. The three tubes that received the air from the bellows passed into three small reservoirs in the trunk of the figure, where they united, and, ascending towards the throat, formed the cavity of the mouth, which terminated in two small lips, adapted in some measure to perform their functions. Within this cavity was a small moveable tongue, which, by its motion at proper intervals, admitted the air, or intercepted it in its passage to the flute. The fingers, lips, and tongue derived their appropriate movements from a steel cylinder turned by clock-work. It was divided into fifteen equal parts, which, by means of pegs pressing upon the ends of fifteen different levers, caused the other extremities to ascend. Seven of these levers directed the fingers, having wires and chains fixed to their ascending extremities, which, being attached to the fingers, caused them to ascend in proportion as the other extremity was pressed down by the motion of the cylinder, and *vice versa*: then the ascent or descent of one end of a lever, produced a similar ascent or descent in the corresponding fingers, by which one of the holes of the flute was occasionally opened or stopped, as it might have been by a living performer. Three of the levers served to regulate the ingress of the air, being so contrived as to open and shut, by means of valves, the three reservoirs abovementioned, so that more or less strength might be given, and a higher or lower note produced. The lips were, by a similar mechanism, directed by four levers, one of which opened them to give the air a freer passage, the other contracted them, the third drew them backward, and the fourth pushed them forward. The lips were projected upon that part of the flute which receives the air, and, by the different motions already mentioned, properly modified the tune. The remaining lever was employed in the direction of the tongue, which it easily moved, so as to shut or open the mouth of the flute. The just succession of the several motions performed by the various parts of the [illegible] was regulated by the following contrivance:—The extremity of the axis of the cylinder terminated on the right side by an endless screw, consisting of twelve threads, each placed at the distance of an eighth of an inch from the other. Above this screw was fixed a piece of co[illegible] pivot, which, falling in[illegible] of the screw, obliged the cy[illegible]llow the threads, and instead of t[illegible] round, it was con[illegible]nually [illegible]. Hence, if a lever

was moved, by a peg placed on the cylinder, in any one revolution, it could not be moved by the same peg in the succeeding revolution, because the peg would be moved an eighth of an inch beyond it by the lateral motion of the cylinder. Thus, by an artificial disposition of these pegs in different parts of the cylinder, the statue was made by the successive elevation of the proper levers to exhibit all the different motions of a flute-player. For a more minute account, see the article Androïde in Nouveau Dictionnaire de Physique par Libes, or, the Mem. Paris Acad. for 1738.

But if the construction of machines capable of imitating even the mechanical actions of the human body, shew exquisite skill, what shall we say of one capable, not only of imitating actions of this kind, but of acting as external circumstances require, as though it were endowed with life and reason? This, nevertheless, has been done. M. de Kempelen, a gentleman of Presburg in Hungary, excited by the performances of M. de Vaucanson, at first endeavoured to imitate them, and at last far excelled them. This gentleman constructed an androides capable of playing at chess!—Every one who is in the least acquainted with this game must know, that it is so far from being mechanically performed, as to require a greater exertion of the judgment and rational faculties than is sufficient to accomplish many matters of greater importance. An attempt, therefore, to make a wooden chess-player must appear as ridiculous as to make a wooden preacher or counsellor of state. That this machine really was made, however, the public have had ocular demonstration. The inventor came over to Britain in 1783, where he remained above a year with his automaton.

It is a figure as large as life, in a Turkish dress, sitting behind a table, with doors of three feet and a half in length, two in depth, and two and a half in height. The chair on which it sits is fixed to the table, which runs on four wheels. The automaton leans its right arm on the table, and in its left hand holds a pipe: with this hand it plays after the pipe is removed. A chess board of eighteen inches is fixed before it. This table, or rather cupboard, contains wheels, levers, cylinders, and other pieces of mechanism, all which are publicly displayed. The vestments of the automaton are then lifted over its head, and the body is seen full of similar wheels and levers. There is a little door in its thigh, which is likewise opened; and with this, and the table also open, and the automaton uncovered, the whole is wheeled about the room. The doors are then shut, and the automaton is ready to play, and it always takes the first move.

At every motion the wheels are heard, the image moves its head, and looks over every part of the chess-board. When it checks the queen, it shakes its head twice, and thrice in giving check to the king. It likewise shakes its head when a false move is made, replaces the piece, and makes its own move; by which means the adversary loses one. M. de Kempelen remarks as the most surprising circumstance attending his automaton, that it had been exhibited at Presburgh, Vienna, Paris, and London, to thousands, many of whom were mathematicians and chess-players, and yet the secret by which he governed the motion of its arm was never discovered. He prided himself solely on the construction of the mechanical powers, by which the arm could perform ten or twelve moves. It then required to be wound up like a watch, after which it was capable of continuing the same number of motions.

The automaton could not play unless M. de Kempelen or his substitute was near it to direct its moves. A small square box, during the game, was frequently consulted by the exhibitor, and herein consisted the secret, which he said he could in a moment communicate. The secret was indeed simple, as our readers will find by referring to the article AUTOMATON, where it is disclosed.

ANDROLEPSY, in antiquity, a term something similar in meaning to our word reprisals. Thus, when one who committed a murder had escaped, the relations of the deceased were empowered to seize three men in the city or house whither the murderer had fled, either till he were surrendered, or satisfaction made for the murder.

ANDROMEDA, in astronomy, a constellation of the northern hemisphere, between Cassiopeia and Pegasus: it represents the figure of a woman chained. The number of stars generally reckoned in this constellation, ranged according to their magnitudes, from 1st to 6th, are 0, 3, 2, 10, 16, 35, in all 66.

ANDROMEDA, the name of a celebrated tragedy of Euripides, highly admired by the ancients, but now lost.

ANDRO'MEDA. Marsh cistus: a genus of the class and order decandria monogynia. Calyx five-parted; corol ovate, with a five cleft mouth; capsule superior, five celled, the partitions from the middle of the valves; anthers with two pores. There are twenty-six species, some natives of cold and others of warm climates. The greater part appertain to Siberia and North America. See Nat. Hist. pl. V.

ANDRON, among the Greeks, an apartment designed for the use of men.

ANDRONA, in ancient writings, has various meanings. 1. A space between two houses. 2. A passage between two apartments. 3. A public street. 4. That part in churches assigned to the men.

ANDROPHAGI, man-eater. See ANTHROPOPHAGI.

ANDRO'POGON. In botany, a genus of the class and order polygamia monoecia. Herm. calyx, glume two-valved, one-flowered; corol, glume awned at the base; stamens three, styles two, seed one, coated. Male corol awnless, stamens three. There are thirty-two species, all of which are exotics, and

the greater number natives of India The two following are worth noticing.

A schoenanthus of Arabian growth, well known by the name of camels' hay A nardus Nard, or spikenard an Indian plant, highly celebrated in ancient and modern times for its perfume

ANDROS, one of the ancient Cyclades, lying between Tenedos and Euboea. The ancients gave it various names, viz Cauros, Lasia, Nonagria, Epagris, Antandros, and Hydrusia F lon 25 30 N lat. 37 50

ANDROSA'CE In botany, a genus of the class and order pentandria monogynia Umbel with a many-leaved involucre; corol with an ovate tube, and glandular throat, capsule one-celled, globular Ten species, nearly the whole of which are natives of Europe, and chiefly of the Alps none are known to be indigenous to our own country

ANDRY'ALA Downy sow-thistle a genus of the class and order syngenesia polygamia æquali Receptacle villous, calyx many parted, nearly equal, rounded, down simple, sessile Six species, all natives of the south of Europe or the Barbary coast

ANECDOTE, ANECDOTA, a term used by some authors for the titles of secret histories, but it more properly denotes a relation of detached and interesting particulars The word is Greek, ανεκδοτα, q d things not yet known or hitherto kept secret Procopius gives this title to a book which he published against Justinian and his wife Theodora, and he seems to be the only person among the ancients who has represented princes such as they are in their domestic relation —Varillas has published Anecdotes of the House of Medicis

ANEMO-CHORD, a name given to the Æolian harp

ANEMO'METER s (ανεμος and μετρον) An instrument to measure the force and velocity of the wind The first instrument of this kind was, we believe, invented by Wolfius in 1708, and described in his Areometry Various machines for the same purpose have been invented by different persons Descriptions of some of them may be seen in Mem Acad Scienc an 1734 Hutton's Translation of Ozanam's Recreations, vol, ii Watson's Trans of Euler on the Theory of Vessels, p 161 Gregory's Mechanics, vol ii p 48 and different parts of the Phil Transac We shall describe two of the best The first is Mr B Martin's improvement upon the anemometer of Wolfius (See pl 10 fig 4) An open frame of wood ABCDEFGHI, is supported by the shaft or arbor I In the two cross-pieces HK, LM, is moved a horizontal axis QM, by means of the four sails, *ak*, *cm*, *of*, *gh*, exposed to the wind in a proper manner Upon this axis is fixed a cone of wood, MNO, upon which, as the sails move round, a weight R, or S, is raised by a string round its superficies, proceeding from the smaller to the larger end NO. Upon this larger end or base of the cone, is fixed a rachet-wheel *k*, in whose teeth the click X falls, to prevent any retrograde motion from the depending weight

The structure of this machine sufficiently shews that it may be accommodated to estimate the variable force of the wind, because the force of the weight will continually increase as the string advances on the conical surface, by acting at a greater distance from the axis of motion, consequently, if such a weight be added on the smaller part M, as will just keep the machine in equilibrio in the weakest wind, the weight to be raised, as the wind becomes stronger, will be increased in proportion, and the diameter of the cone NO may be so large in comparison to that of the smaller end at M, that the strongest wind shall but just raise the weight at the greater end

If, for example, the diameter of the axis be to that of the base of the cone NO as 1 to 28, then, if S be a weight of one pound at M on the axis, it will be equivalent to 28 pounds when raised to the greater end If, therefore, when the wind is weakest, it supports one pound on the axis, it must be 28 times as strong to raise the weight to the base of the cone If therefore a line or scale of 28 equal parts be drawn on the side of the cone, the strength of the wind will be indicated by that number on which the string rests

In the Philos. Transactions for the year 1775, Dr Lind gives a description of a very ingenious portable wind-gage, by which the force of the wind is easily measured, a brief description of the principal parts of which here follows This simple instrument consists of two glass tubes, AB, CD, (pl 10 fig 5) which should not be less than eight or nine inches long, the bore of each being about $\frac{4}{10}$ of an inch diameter, and connected together by a small bent glass tube *ab*, only of about $\frac{1}{10}$ of an inch diameter, to check the undulations of the water caused by a sudden gust of wind On the upper end of the leg AB is fitted a thin metal tube, which is bent perpendicularly outwards, and having its mouth open to receive the wind blowing horizontally into it The two tubes, or rather the two branches of the tube, are connected to a steel spindle KL by slips of brass near the top and bottom, by the sockets of which at *e* and *f* the whole instrument turns easily about the spindle, which is fixed into a block by a screw in its bottom, by the wind blowing in at the orifice at F When the instrument is used, a quantity of water is poured in, till the tubes are about half full, then exposing the instrument to the wind, by blowing in at the orifice F, it forces the water down lower in the tube AB, and raises it so much higher in the other tube, and the distance between the surfaces of the water in the two tubes, estimated by a scale of inches and parts HI, placed by the sides of the tubes, will be the height of a column of water whose weight is equal to the force or momentum of the wind blowing or striking against an equal base. And as a cubic foot of water

weighs 1000 ounces, or 62½ pounds, the twelfth part of which is 5$\frac{5}{24}$ or 5¼ pounds nearly, therefore for every inch the surface of the water is raised, the force of the wind will be equal to so many times 5¼ pounds on a square foot. Thus, suppose the water stand three inches higher in the one tube, than in the other; then three times 5¼ or 15¾ pounds is equal to the pressure or force of the wind on the surface of a foot square

This instrument of Dr Lind's measures only the force or *momentum* of the wind, but not its velocity. However the velocity of the wind may be deduced from its force so obtained, by help of some experiments performed by Dr Hutton at the Royal Military Academy, in the years 1786, 1787, and 1788; from which experiments it appears that a plane surface of a square foot suffers a resistance of twelve ounces from the wind, when blowing with a velocity of twenty feet per second, and that the force is nearly as the square of the velocity. Hence then, taking the force of 15¾ pounds, above found, for the force of the wind when it sustains three inches of water, and taking the square roots of the forces, it will be as $\sqrt{\frac{3}{4}}$: $\sqrt{15\frac{3}{4}}$ :: 20 : 91¼ the fourth proportional, that is, a velocity of 91¼ feet per second, or 62 miles per hour, is the rate or velocity at which the wind blows, when it raises the water three inches higher in the one tube than the other. And farther, as the said height is as the force, and the force as the square of the velocity, we shall have the force and velocity, corresponding to several heights of the water in the one tube above that in the other, as in the following table.

Table of the corresponding Height of Water, Force on a Square Foot, and Velocity of Wind

Height of Water	Force of Wind.	Velocity of Wind per Hour
Inches.	Pounds.	Miles
0¼	1·3	18 0
0½	2 6	25 6
1	5 2	36 0
2	10·4	50 8
3	15 6	62 0
[illegible]	20 8	76 0
[illegible]	26 0	80 4
[illegible]	31 25	88 0
[illegible]	36·5	95 2
[illegible]	41 7	101 6
[illegible]	[illegible]	108 0
10	[illegible]	113 6
11	[illegible]	119 2
12	[illegible]	124 0

In one instance Dr Lind found that the force of the wind was such as to be equal 34$\frac{5}{8}$ pounds, on a square foot, and this by proportion, in the foregoing table, will be found to answer to a velocity of [illegible] miles per hour; a velocity which, since M Garnerin's celebrated aerial voyage to Colchester, must be reckoned within the bounds of probability

ANE'MONE. Wind-flower: a genus of the class and order polyandria polygynia Calyxless; petals from five to nine seeds numerous. There are twenty-seven species, all among the highest ornaments of our gardens about four of them, in their simplest state, are natives of our own country; the rest derive their birth from warmer climates The hepaticas, pulsatillas, or pasque-flowers, and anemonoides, are all included in the present arrangement of this genus Several of the species are used medicinally, especially a hepatica under the pharmaceutic name of HEPATICA NOBILIS, which see, a nemorosa under that of RANANCULUS ALBUS, which see, and a pratensis under that of PULSATILLA NIGRICANS, which see.

ANEMONOIDES See ANEMONE

ANEMOSPERMOS In botany See GORTERIA

ANEMOSCOPE, is sometimes used to denote a machine invented to foretel the changes of the wind, or weather, and sometimes for an instrument shewing by an index what the present direction of the wind is Of this latter sort, it seems, was that used by the ancients, and described by Vitruvius, and we have many of them at present in large or public buildings, where an index withinside a room or hall points to the name of the quarter from whence the wind blows without, which is simply effected by connecting an index to the lower end of the spindle of a weather-cock

The term anemoscope has likewise been used by Stone and others, to denote what is now commonly called an hygrometer

ANENCEPHALOUS (ανεγκεφαλο, from α priv and εγκεφαλος, *the brain*) Brainless born without brains

ANENT *prep* (Scotch dialect) 1 Concerning, about 2 Over against, opposite to

ANEPITHYMIA (from α priv and επιθυμια, *desire*) Loss of appetite

ANES *s* The spires or beards of corn

A'NESIS (from ανιημι, *to relax*) A remission or relaxation of a disease or symptom

A'NET The herb dill See ANETHUM, of which it is a contraction

ANETHUM Dill a genus of the class and order pentandria digynia Fruit ovate, somewhat compressed, striate, petals involute, entire There are three species 1. a. graveolens, 2 a. segetum, both natives of Spain and Portugal 3 a. fœniculum, or fennel, a native of our own cliffs

The seeds of the a. graveolens, which is also found by cultivation in England, are directed for use by the London and Edinburgh pharmacopœias: they have a moderately warm, pungent taste, and an aromatic, but sickly smell There is an essential oil, and a distilled water, prepared from them, which are given in flatulent colics and dyspepsia They are also said to promote the secretion of milk.

A'NEURISM. (ανευρυσμα, ανευρυνω, from

ανευρυνω, *to dilate*) A preternatural dilatation of an artery A genus of diseases ranked by Cullen in the class locales, and order tumores There are three species of aneurism 1 The true aneurism, aneurisma verum, which answers to the above definition, and is known by the presence of a pulsating tumour. 2 The spurious aneurism, aneurisma spurium, which is a collection of blood in the cellular membrane from a ruptured artery 3. The varicose aneurism, aneurisma varicosum which was first described by Dr W. Hunter It occurs when the brachial artery is punctured in opening a vein: the blood then rushes into the vein, which becomes varicose Aneurisms may happen in any part of the body, except the latter species, which can only take place where a vein runs over an artery

A'NEURISMA SPURIUM See ANEURISM

A'NEURISMA VARICOSUM See ANEURISM

A'NEURISMA VERUM See ANEURISM

ANEW *ad* (from *a* and *new*) 1 Over again, another time (*Prior*) 2 Newly, in a new manner (*Rogers*)

ANFRA'CTUOUS *a* (*anfractus*, Latin) Winding mazy, full of turnings and winding passages (*Ray*)

ANFRA'CTUOUSNESS *s* (from *anfractuous*) Fulness of windings and turnings

ANGARI, in antiquity, public couriers appointed to carry messages By the Persians these were called *astandæ*, by the Greeks ημεροδρομοι

ANGARIA, in Roman antiquity, a kind of public service, imposed on the provincials, which consisted in providing horses and carriages for the conveyance of military stores, and other public burdens

ANGEIO TOMY (*angeiotomia*, αγγειοτομια, from αγγειον, *a vessel*, and τεμνω, *to cut*) The dissection of the blood-vessels of an animal body, also the opening of a vein or an artery

ANGEIO'TOMIST (from *angeiotomy*) A person skilled in the course of the vessels, or who can accurately dissect them

ANGEL, a spiritual intelligent substance, the first in rank and dignity among created beings The word angel is Greek, and signifies a messenger, the Hebrew מלאך signifies the same thing The angels are in Daniel (chap iv ver 13, &c.) called עירין, or watchers, from their vigilance for the same reason they are, in the remains we have of the prophecy attributed to Enoch, named Egregori, which word imports the same in Greek —Angels, therefore, in the proper signification of the word, do not import the nature of any being, but only the office to which they are appointed, especially by way of message or intercourse between God and his creatures, in which sense they are called the ministers of God, who do his pleasure, and ministering spirits sent forth to minister for them who shall be heirs of salvation. That there are such beings as we call angels, that is, certain permanent substances, invisible, and imperceptible to our senses, endued with understanding and power superior to that of human nature, created by God, and subject to him as the Supreme Being; ministering to his divine providence in the government of the world by his appointment, and more especially attending the affairs of mankind, is a truth so fully attested by Scripture, that it cannot be doubted Nay, the existence of such invisible beings was generally acknowledged by the ancient heathens, though under different appellations the Greeks called them dæmons, and the Romans genii, or lares Epicurus admitted their existence, but denied their exercising any control over other existences (See Good's Life of Lucretius) The belief however of middle intelligences influencing the affairs of the world, and serving as ministers or interpreters between God and man, is almost as extensive as the belief of a God, having seldom, so far as we know, been called in question by those who had any religion at all

ANGEL is likewise a title given to bishops of several churches In this sense is St Paul understood by some authors, where he says, Women ought to be covered in the church, because of the angels The bishops of the seven churches of Asia were, by a name borrowed from the synagogue, called the angels of those churches.

ANGEL, in commerce, the name of a gold-coin formerly current in England It had different values in different reigns it is now a mere nominal money, implying ten shillings Its half was called angelot or angelet.

ANGEL-FISH. See SQUALUS

ANGELIC, ANGELICAL 1 Resembling angels 2 Partaking of the nature of angels 3 Belonging to angels.

ANGELIC GARMENT, Angelica vestis, among our ancestors, was a monkish garment, which laymen put on a little before their death, that they might have the benefit of the prayers of the monks It was from them called angelical, because they were called angeli who by these prayers animæ saluti succurrebant

ANGE'LICA (so called from its supposed angelic virtues) In botany, a genus of the class and order pentandria dygynia Fruit roundish, solid, with three wings each side, calyx five-toothed, corols uniform, petals incurved, styles reflected Six species, found in Europe and America; of which two, a. archangelica, garden angelica, and a. sylvestris, wild angelica, are common to our own moors or meadows The roots of the first have a fragrant, agreeable smell, and a bitterish, pungent taste The stalk, leaves, and seeds which are also directed in the pharmacopœias, possess the same qualities, though in an inferior degree Their virtues are aromatic and carminative A sweetmeat is made by the confectioners of this root, which is extremely agreeable to the stomach, and is surpassed only by that of ginger. Rectified spirit extracts

the whole of the virtues of the plant, water but very little, excepting in distillation, during which a small portion of very pungent essential oil is obtained The second species indigenous to our own country, or a sylvestris, possesses similar properties to the garden species, but in a much inferior degree. It is only used when the latter cannot be obtained The seeds, powdered and put into the hair, kill lice

ANGELICA TREE See ARALIA

ANGELICALNESS s Excellence more than human

ANGELICI, an ancient order of knights, instituted in 1191, by Isacius Angelus Flavius Comnenus, emperor of Constantinople They were divided into three classes, but all under direction of one grand master The first were called torquati, from a collar which they wore, and these were fifty in number The second were called the knights of justice, and were ecclesiastics And the third were called knights servitors

ANGELINÆ CORTEX The tree from which this bark is procured is a native of Grenada It has been recommended as an anthelmintic for children

ANGELITÆ, Angelites, in ecclesiastical history, certain Christians, thus denominated from Angelium, the name of a place in Alexandria, where their first assemblies were held They made their first appearance in the time of the emperor Anastasius, and pope Symmachus, about the year of Christ 494 The distinguishing tenets of the Angelitæ were, that the several persons of the Trinity had no distinct essence, substance, or deity, but only a subsistence or deity in common, or indivisible among them

ANGELO BUONAROTI (Michael), a famous artist, was born in 1474, at the castle of Chiusi, in the territory of Arezzo, in Tuscany Shewing an early inclination for designing, he was put under Dominico Ghirlandaio, under whom he made a very rapid progress. Having finished his studies, he was taken under the patronage of Lorenzo de Medici, but when the troubles broke out at Florence, he removed to Bologna Angelo made an exquisite statue of Cupid, which he carried to Rome, and having broke off one of the arms, buried it in a place that was soon to be dug up. The statue being found, was sold to a cardinal for a fine antique, but our artist discovered the fallacy, by shewing the arm which he had kept for the purpose As a painter his style is very sublime though some connoisseurs say he was incomparable in designing, but knew little of colouring His greatest pieces are the Crucifixion, and the Last Judgment. An eminent traveller says of the last, that while he viewed it his blood was chilled, and he felt as if all he saw was real He died at Rome in 1564, and his remains were interred with great funeral pomp at Florence

ANGELO (St.), a strong town of Italy Lat 41, 40 N, Lon. 16. 12 E. There are several other towns and castles of the same name in Italy

ANGELOLATRIA, the superstitious worship, or adoration of angels

ANGELOT, in commerce, a small, fat, rich sort of cheese, brought from Normandy

A'NGER s. (from anger, Sax vexed) 1 Uneasiness upon receipt of any injury, with a purpose of revenge (*Locke*) 2 Pain, or smart of a sore (*Temple*)

Anger, viewed as a passion, that is, as referring to the first impression, in which we are passive, or the impression preceding the external signs, which constitute the emotion, may be considered as a painful sensation of a heating, irritating nature It is an irksome stimulus, by which the animal spirits are troubled, and violently agitated Where the injury appears great, totally unprovoked, too recent or sudden for the mind to call up motives of restraint, when surprise at receiving an offence from a quarter the most remote from expectation, or astonishment at base and ungrateful returns for benefits conferred, accompany the first impulse of passion, an ardent desire of revenge is immediately excited The imagination runs over every circumstance of aggravation, depicts the offence as a crime of the most atrocious nature, and vengeance is denounced against the aggressor, as an indispensable obligation of justice, and as a retribution due to the violated laws of morality, of honour, or of gratitude The emotions strikingly correspond with this state of mind The corporeal system immediately assumes attitudes and appearances calculated to inspire the offender with terror The countenance reddens, the eyes flash indignant fire, and the whole aspect speaks horror, muscular strength is abundantly increased, and powers of exertion are acquired, unknown to cooler moments This new appetite for revenge gains the ascendency, not only over every consideration of compassion, but of personal safety, and impels to dangerous encounters, totally regardless of the danger In some instances, an apprehension of dreadful consequences, a kind of presage of the mischief that may possibly ensue, and become the subject of future regret, intermixes fear with the paroxysms of anger, and a pallid tremour unites with symptoms peculiar to wrath, or accompanies the first tokens of revenge

Anger is deservedly placed among the most violent emotions From its ungovernable excesses (see RAGE), it has almost appropriated to itself the term passion When the paroxysms of anger are excessive, the subject is deaf to the most cogent reasons, or to the most pathetic representations of the mischief it may occasion, and being worked up to a degree of phrenzy he fully vindicates the adage *Ira brevis furor* While under the influence of this turbulent emotion, the incensed person often imagines that he is solely actuated by the purest love of equity, and ardent desire to administer justice, though at the instant he may be vic-

lating the dictates of compassion, in the perpetration of the most atrocious deeds It is observable, that sorrow and fear, though they may be the result of culpable conduct, or even criminality, are calculated to excite our compassion The anguish manifested by the subject, calls aloud for our sympathy but anger, though it is a painful emotion, excites no sympathy, unless we suppose the subject to be insane In cases where we acknowledge the provocation has been very great, our sympathy is transferred to the object of resentment, prompting us to act as mediators, and exert all our influence to mitigate or avert the punishment to which he is exposed Cogan on the Passions, p 111

Collins's striking picture of Anger in his fine ode on the Passions, is as below

Next Anger rush'd, his eyes on fire
In lightnings own'd his secret stings,
In one rude clash he struck the lyre,
And swept with hurried hand the strings

Bishop Butler very justly observes, that anger is far from being at all times a selfish passion, since it is naturally excited by injuries offered to others as well as to ourselves, and was designed by the Author of Nature not only to excite us to act vigorously in defending ourselves from evil, but to interest us in the defence or rescue of the injured and helpless, and to raise us above the fear of the proud and mighty oppressor Hence therefore the precept, "Be ye angry and sin not Anger becomes sinful, however, and contradicts the rule of scripture, when it is conceived upon slight and inadequate provocations, when its motives are low and selfish, or when it continues long It is then contrary to the amiable spirit of charity, which "suffereth long, and is not easily provoked' Hence these other precepts, "Let every man be slow to anger," and, "Let not the sun go down upon your wrath

To A'NGER *v a* (from the noun) 1 To provoke, to enrage (*Clarendon*) 2 To make painful (*Bacon*)

A'NGERLY *ad* In an angry manner (*Shakspeare*)

ANGERONALIA, in antiquity, feasts celebrated at Rome in honour of Angerona, the goddess of silence and patience

ANGERS, an ancient town of France, in the late province of Anjou, and the episcopal town of the department of Maine and Loire It contains about 30000 inhabitants Lat 47 30 N Lon 0 35 W

ANGHIERA, the capital town of a county of the same name, of Milan, in Italy Lat 45 42 N Lon 8 40 E

ANGIGLO'SSUS (αγκυγλωσσος, from αγκυλη, *a hook*, and γλωσσα, *the tongue*) A person who stammers, or labours under a psellismus

ANGILDUM, in our old writers, denotes a simple gild, that is, the simple value of the man, or other thing

ANGI'NA (*angina*, from αγχω, *to strangle*; because it is often attended with a sense of strangulation) A sore throat See CYNANCHE

ANGI'NA PECTORIS Syncope anginosa An extremely dangerous disease, which seizes those who are subject to it, when walking, with a very painful sensation in the breast, threatening immediate suffocation, and often inducing syncope, but the moment they stand still all the uneasiness vanishes A few months after the disease has taken place, the fits will not cease instantaneously on standing still, and they take place in almost all situations, sitting still, or abed, as well as when walking about The duration of the paroxysm is uncertain at first, it goes off on being still, it then continues some time after with great palpitation of the heart, and, at length, does not leave the patient for some hours It frequently happens that persons die soon after the attack of a fit, but cases are related where it induced some other disease which terminated in lingering illness In all cases the seat of pain is about the sternum and heart, and very frequently there is a fixed pain in the left arm, near the insertion of the deltoid muscle The proximate cause of this disease is not known Ossification of the coronary arteries of the heart, and accumulation of fat about that organ, the mediastinum, pericardium, and diaphragm, have been observed in those who have died under the disease, and at times a preternatural communication between the right and left ventricles of the heart

ANGIO'GRAPHY *s* (from αγγειον and γραφω) A description of vessels in the human body

ANGIO'LOGY (*angiologia*, αγγειολογια, from αγγειον, *a vessel*, and λογος, *a discourse*) The doctrine of the vessels of the human body See ANATOMY

ANGIOMONOSPE'RMOUS *a* (from αγγειον, μονο and σπερμα) Such plants as have but one single seed in the seed-pod

ANGIO'PTERIS In botany, a genus of the class and order cryptogamia filices, thus characterized, fructification oval, sessile, in a line near the margin of the frond, approximate in a double row, one celled Only one species of this fern has hitherto been traced

ANGIOSPE'RMIA The name of the second order in the class didynamia of the Linnéan system It is so called, because the seeds, σπερματα, are inclosed in a vessel, αγγος, or capsule in opposition to the first order, gymnospermia, which has naked seeds

ANGLE ANGULUS, in geometry, the opening, or mutual inclination, of two lines, or of two or more planes, meeting in a point called the vertex, or angular point

The most general division of angles is, into plane, spherical, and solid

A plane, rectilineal Angle, is the inclination of two straight lines to one another, which meet together, but are not in the same straight line

Spherical Angle, is an angle formed on the surface of a sphere by the intersection of two

great circles; or, it is the inclination of the planes of the two great circles.

The measure of a spherical angle, is the arc of a great circle of the sphere, intercepted between the two planes which form the angle, and which cuts the said planes at right angles. For their properties, &c. see SPHERE, SPHERICAL, and SPHERICAL TRIGONOMETRY.

Solid Angle, is the mutual inclination of more than two planes, or plane angles, meeting in a point, and not contained in the same plane, like the angles or corners of solid bodies.

Clavius and some other authors have asserted, that those solid angles are equal which are contained by the same number of plane angles that are equal to one another, each to each: but this is a mistake, for Dr. Simson has shewn in the notes to his valuable edition of Euclid's Elements, that there may be innumerable solid angles all unequal to one another, which are each of them contained by the same plane angles disposed in the same order. Solid angles, indeed, are magnitudes of a very peculiar kind, and may be remarked for not admitting of that accurate comparison, one with another, which is common in the other subjects in geometry. It cannot, for example, be said of one solid angle, that it is the half, or the double of another solid angle, nor did any geometer ever think of proposing the problem of bisecting a given solid angle. In fact, no multiple, or sub-multiple, of such an angle can be taken, and we have no way of expounding, even in the simplest cases, the ratio which one of them bears to another. In this respect, therefore, a solid angle differs from every other magnitude that is the subject of mathematical reasoning, all of which have this common property, that multiples and sub-multiples of them may be found. We do not here enquire what is the reason of this anomaly, but it is obvious that, on account of it, our knowledge of the nature and properties of such angles can never be very far extended, and that our reasonings concerning them must be chiefly confined to the relation of the plane angles by which they are contained. Having premised these general definitions and remarks, we now proceed to some that are more particular, confining our attention chiefly to plane angles.

Angles are sometimes denoted, or named, by the single letter placed at the angular point, as the angle A, fig. 10 pl. 12 and sometimes by three letters, placing always that of the vertex in the middle. The former method is used when only one angle has the same vertex; and the latter method is necessary when several angles have the same vertex, to distinguish them from one another.

The measure of an angle, by which its quantity or magnitude is expressed, is an arch, as DE described from the centre A, with any radius at pleasure, and contained between its legs AB and AC.—Hence angles are compared and distinguished by the ratio of the arcs which subtend them to the whole circumference of the circle, or by the number of degrees contained in the arc DE by which they are measured, to 360, the number of degrees in the whole circumference of the circle. And thus an angle is said to be of so many degrees, viz. as are contained in the arc DE.

Hence it matters not with what radius the arc is described, by which an angle is measured, when great or small, as AD, or A*d*, or any other: for the arcs DE, *de*, being similar, have the same ratio as their respective radii or circumferences, and therefore they contain the same number of degrees. Hence it follows, that the quantity or magnitude of the angle remains still the same, though the legs be ever so much increased or diminished. And thus, in similar figures, the like or corresponding angles are equal.

The taking or measuring of Angles, is an operation of great use and extent in surveying, navigation, astronomy, &c. The instruments chiefly used for this purpose are QUADRANTS, SEXTANTS, OCTANTS, THEODOLITES, CIRCUMFERENTERS, &c. for the description and use of which, see the respective articles in this Dictionary. For measuring the quantity of an angle on paper, M. de Lagny gave, in the Memoirs of the Royal Academy of Sciences, a new and very ingenious method, which we shall describe under the article GONIOMETRY.

ANGLES, with regard to the form of their legs, are divided into rectilinear, curvilinear, and mixed.

Angle, rectilinear, or right lined, is that whose legs are both right lines.

Angle, curvilinear, is that whose legs are both of them curves.

Angle, mixt, or mixtilinear, is that, one of whose sides is a right line, and the other a curve.

With regard to their quantity, angles are again divided into right, and oblique, acute, and obtuse.

Right angle, is that which is formed by one line perpendicular to another, or that which is subtended by a quadrant of a circle: as the angle ABC (fig. 14.) Therefore, the measure of a right angle is a quadrant of a circle, or 90°, and consequently all right angles are equal to each other.

Oblique angle, is a common name for any angle that is not a right one; and is either acute or obtuse.

Acute angle, is that which is less than a right angle, as the angle DBC. fig. 14.

Obtuse angle, is that which is greater than a right angle, as EBC. fig. 14. pl. 12.

Angles are distinguished with regard to their situation relatively to each other, into contiguous, adjacent, vertical, opposite, and alternate.

Contiguous angles, are such as have the same vertex, and one leg common to both, as

EBA, ABD (fig 14) which have AB common

Adjacent angles, are those of which a leg of the one produced forms a leg of the other as the angles AEC and BEC, (fig 12) which have the legs AE and EB in a straight line Hence adjacent angles are supplements to each other, making together 180°, or two right angles

Vertical or opposite angles, are such as have their legs mutually continuations of each other as CEA and BED, or CEB and AED, (fig 12) Vertical or opposite angles are always equal to each other as AED = CEB

Alternate angles, are those made on the opposite sides of a line cutting two parallel lines See ALTERNATE ANGLES

Angle at the centre of a circle, is an angle in a circle, whose vertex is in the centre of that circle: as AEC, fig 1 pl 13

Angle at the periphery, or in a segment, is an angle whose vertex is in the periphery, and its legs two chords of the circle Thus AB, BC, are two chords of the circle ABCD, (fig 1) making an angle B at the periphery, which is called an angle in a segment

This angle is always equal to half the angle at the centre, standing upon the same arch Also, all angles in a segment, standing upon the same arch, are equal to one another Thus the angles ABC, AGC, AFC, are equal, and are each equal to half the angle AEC at the centre

If the right line AB (fig 13 pl 12) touch the circle in C, and the chord CD be drawn, then will the angle ACD be equal to any angle CED, made in the segment DEC

When the arch is a semicircle, the angle will be a right angle Thus if the arch ABC (fig 15) be a semicircle, the angle ABC will be a right angle When it is greater than a semicircle, the angle will be acute, but when less, it will be obtuse

Angle of contact, is that made by a curve line and a tangent to it, at the point of contact, as the angle IHK (fig 11 pl 12) It is proved by Euclid, that the angle of contact between a right line and a circle, is less than any right-lined angle whatever, though it does not therefore follow that it is of no magnitude or quantity This has been the subject of great disputes amongst geometricians, in which Peletarius, Clavius, Tacquet, Wallis, &c bore a considerable share, Peletarius, Ozanam, and Wallis contending that it is no angle at all, against Clavius, who rightly asserts that it is not absolutely nothing in itself, but only of no magnitude in comparison with a right-lined angle, being a quantity of a different kind or nature, as a line in respect to a surface, or a surface in respect to a solid, &c And since his time, it has been proved by sir I Newton, and others, that angles of contact can be compared to each other, though not to right-lined angles, and what are the proportions which they bear to each other Thus, the circular angles of contact IHK, IHL, are to each other in the reciprocal subduplicate ratio of the diameters HM, HN. And hence the circular angle of contact may be divided, by describing intermediate circles, into any number of parts, and in any proportion And if, instead of circles, the curves be parabolas, and the point of contact H the common vertex of their axes, the angles of contact would then be reciprocally in the subduplicate ratio of their parameters But in such elliptical and hyperbolical angles of contact, these will be reciprocally in the subduplicate of the ratio compounded of the ratios of the parameters, and the transverse axes See Hutton's Dictionary, and Maclaurin's Flux vol ii p 473--474

Angles, in mechanics 1 Angle of direction, is that comprehended between the lines of direction of two conspiring forces 2 Angle of elevation, is that which is comprehended between the line of direction, and any plane upon which the projection is made, whether horizontal or oblique

Angle of incidence, in optics, the angle which a ray of light makes with a perpendicular to that point of the surface of any medium on which it falls, though it is sometimes understood of the angle which it makes with the surface itself

Angle of refraction, now generally means the angle which a ray of light, refracted by any medium, makes with a perpendicular to that point of the surface, on which it was incident, but has sometimes been understood of the angle which it makes with the surface of the refracting medium itself It is a constant law of refraction that the ratio of the sines of incidence and refraction, is a fixed ratio, whatever be the obliquity of the incident ray, the media remaining See REFRACTION

Angle in astronomy As angles of commutation, elongation, parallactic angle, &c See COMMUTATION, ELONGATION, &c

Angle at the sun, the angle under which the distance of a planet from the ecliptic appears at the sun

Angle of obliquity of the ecliptic See ECLIPTIC, and OBLIQUITY

Angle of longitude, the angle which the circle of a star's longitude makes with the meridian at the pole of the ecliptic

Angle of the rhumb, in navigation See RHUMB, and LAXODROMIC

Angles, in fortification, are understood of those formed by the several lines used in fortifying, or making a place defensible

These are of two sorts, real, and imaginary. —Real angles are those which actually subsist and appear in the works —Such are the flanked angle, the angle of the epaule, angle of the flank, and re-entering angle of the counterscarp —Imaginary, or occult angles, are those which are only subservient to the construction, and which subsist no more after the fortification is drawn —Such are the angle of the centre, angle of the polygon, flanking angle, saliant angle of the counterscarp, &c

Angle of, or at, the centre, is the angle formed

at the centre of the polygon, by two radii drawn from the centre to two adjacent angles, and subtended by a side of it, as the angle ACB, (fig 2 pl 13) This is found by dividing 360° by the number of sides in the regular polygon

Angle of the polygon, is the angle intercepted between two sides of the polygon, as DAB, or ABE This is the supplement of the angle at the centre, and is therefore found by subtracting the angle C from 180 degrees

Angle of the triangle, is half the angle of the polygon, as CAB, or CBA, and is therefore half the supplement of the angle C at the centre

Angle of the bastion, is the angle FAG made by the two faces of the bastion And is otherwise called the flanked angle

Diminished angle, is the angle BAG made by the meeting of the exterior side of the polygon with the face AG of the bastion

Angle of the curtin, or of the flank, is the angle GHI made between the curtin and the flank

Angle of the epaule, or shoulder, is the angle AGH made by the flank and the face of the bastion

Angle of the tenaille, or exterior flanking angle, is the angle AKB made by the two rasant lines of defence, or the faces of two bastions produced

Angle of the counterscarp, is the angle made by the two sides of the counterscarp, meeting before the middle of the curtin

Angle, flanking inward, is the angle made by the flanking line with the curtin

Angle forming the flank, is that consisting of one flank and one demigorge

Angle forming the face, is that composed of one flank and one face

Angle of the moat, is that made before the curtin, where it is intersected

Re-entering, or re-entrant angle, is that whose vertex is turned inwards, towards the place, as H or I

Saliant, or sortant angle, is that turned outwards advancing its point towards the field, as A or G

Dead angle, is a re-entering angle, which is not flanked or defended

A'NGLE *s* (*angel*, German) An instrument to take fish, consisting of a rod, a line, and a hook (*Pope*)

To ANGLE *v a* (from the noun) 1 To fish with a rod and hook (*Waller*) 2 To try to gain by some insinuating artifices (*Shakspeare*)

ANGLE-BERRIES Excrescences to which cows are subject chiefly about the abdomen They are commonly sarcomatous, sometimes with a broad base and sometimes hanging from a pedicle They are easily removed by excision on their first appearance, and even afterwards if of the latter description, by passing a tight ligature round the base of the pedicle If [illegible] of the excrescence be broad it should [illegible] dissected out.

A'NGLE-ROD *s* (*angel roede*, Dutch) The stick to which the fisher s line and hook are hung (*Addison*)

A'NGLER See LOPHIUS

A'NGLER *s* (from *angle*) He that fishes with an angle (*Dryden*)

ANGLES, an ancient German nation, originally a branch of the Suevi after various migrations they settled in that part of Denmark which is still called Angel, and of which Flensburg is the capital To this nation the British ambassadors applied, when soliciting succours against the Scots and Picts The Angles, therefore, came over in greater numbers than any other Saxon nation, and accordingly had the honour of giving the name of Anglia to England

ANGLESEA, or ANGLESEY (isle of,) is the most western county of North Wales It was anciently called Mona and was the seat of the Druids It contains about 200 000 acres, nearly 5000 of which are uncultivated It is divided into 6 hundreds, having 74 parishes, 2 market towns, and about 34000 persons This county is fertile, abounding in corn, cattle, fish, and fowl

This island once formed a part of the main land of Wales The chief town is Beaumaris The greatest curiosity which Anglesea can boast, and the chief source of its wealth is the Paris mountain, the name of which is most probably derived from the old Welsh word Praos, signifying "brass, which might easily be corrupted into Paris The copper-mines in this part of the island are supposed to have been known and worked by the Romans The mine of this mountain is considerably more than a mile in circumference, and, on an average, 1300 men are constantly employed in it It has the singular advantage of being worked in the open air, a circumstance which expedites the labour, and secures the health of those that are employed

ANGLIA EAST in history, one of the kingdoms of the Heptarchy, founded by the Angles that landed on the eastern coasts of Britain It contained the two counties of Norfolk and Suffolk, with part of Cambridgeshire Ethelbert, the last sovereign of this kingdom, was murdered, by Offa, king of Mercia, in 792 after which East Anglia was united with Mercia

ANGLICANÆ GUTTÆ See GUTTÆ

A'NGLICISM *s* (from *Anglus*, Lat) An English idiom (*Milton*)

ANGLICUS SUDOR (from *Anglia*, England, and *sudor*, sweat) The sweating sickness, a disease once sporadic to Englishmen, or endemic to the country, but now no longer in existence

ANGLING, the art of catching fishes by rods, hooks, and lines, accompanied often with floats and other tackle, of different construction, with baits natural or artificial, according to the season of the year and the fish intended to be caught The species of fishes which chiefly engage the attention of the angler are bream,

chub, barbel, smelt, salmon, grayling, gudgeon, bleak, dace, roach, perch, pope, carp, tench, trout, pike, eel In illustration of the soundings, seasons, baits, and floats, see the table in the next page

For the rod, the hazel, and especially the cob-nut, affords the best, straightest, and most tapering wood, which should be cut about Christmas, and not used till duly seasoned

The rod should generally consist of three or four parts, diminishing in size with nicety, but with their approximating ends exactly fitted to each other whether glued together, so as to form one inseparable piece, or feruled so as to slide into each other at will To preserve it from moisture, and especially, to maintain its elasticity, it should be varnished with scraped caoutchouc or Indian rubber, dissolved in linseed oil, with a moderate proportion of seed or shell lac, applied with a camel-hair pencil The salmon rod, all but the whalebone top, is usually made of ash, as being the lightest wood but sometimes, the rod for general purposes is composed of different woods, the but being of yellow deal, seven feet long; next a straight hazel of about six feet, and then a delicate piece of fine grained yew, accurately tapered and ending in a point of whalebone, measuring together about two feet

The hairs most proper for the line is that taken from a young, healthy, grey or white stallion, and which is of a pale transparent water colour, that from the middle of the tail is best They should be well washed in water, and slowly dried They should be also well sorted, for every hair in every link should be equally big, round and even, that the strength may be so proportionate, that they will not break singly, but all together Sorrel, chesnut, or brown hairs, however, are best for ground angling, especially in muddy water, as they nearly resemble the colour of the water

Floats are of many kinds, of swan, goose, Muscovy duck, and porcupine quills They should be so loaded as just to suffer their tops to appear above the surface, that the slightest nibble may be perceived But for heavy fishing with worm or minnow, a cork float is best, which is made by taking a cork free from flaws, and boring with a small red hot iron a hole lengthways through the centre it is then to be cut across the grain with a sharp knife about two thirds of the length, and the remaining third (which is the top of the float) rounded with it, and then neatly finished with pumice-stone, the whole to resemble in shape a child's peg-top In fishing with a float, the line should be a foot shorter than the rod if longer it is inconvenient when a fish is wanted to be disengaged, and the rod should be from fourteen to fifteen feet long, light, stiff, and so smart in the spring as to strike at the extremity of the whale-bone

The hooks demanded in the general science of angling are far more diversified than the floats, and must be for the most part adapted to the species of fish intended to be fished for Their excellence depends on their being so tempered as not to snap, and yet not to bend with the force of the fingers In choosing them those should be preferred that are longest in the shank, strong, and rather deep in the bed, the point fine and straight, and as true as it can be set to the level of the shank, the point should be sharp, and the barb of an ample length When hooks are blunt a small whetstone will restore their sharpness much better than a file, which always leaves them rough and jagged

When the angler means to fish at bottom he must take care to have with him a general assortment of tackle, independently of that already enumerated such as different kinds of lines neatly coiled up, strong single hairs, hooks untied of various sorts, as well as hooks tied to bottom links of coarse and fine gimp, of twisted and single silk-worm gut, of hog's bristles, and of white and sorrel hair he must likewise be provided with cork and quill floats and spare caps, shot split and small pistol bullets to poise the floats, shoemaker's wax in a piece of leather, for the purpose of arming the hooks, silk of various sizes and colours, recollecting that hooks for worm-fishing and red-paste are usually tied on with scarlet, those for gentles with yellow paste, and for grubs with straw-coloured silk a plummet to ascertain the depth of the water when a float is used, a clearing-ring to disentangle the hook, which is used by running it along and over the top of the rod, and gradually down the line to where the hook is fast, if at a stump or other immoveable substance, but if it be hung to weeds, let the ring get below the hook, then pull the twine, and the ring will break the weeds, and thus save both line and hook In the former case if it do not release the hook, it will enable the line to be broken near to it, and prevent the line from being strained in any other part The angler must also be provided with a sharp pen-knife, pair of scissars, small whetstone, landing net, disgorger, and light fish-basket, pannier or creel Of coloured clothes green is the best to angle in, as the least likely to excite attention among fishes, but glaring colours should by all means be avoided In a pond the best place to try our sport is where cattle go to drink, for the harmless disturbances they are accustomed to in such places the fish keep free from suspicion Deep waters are preferable to shallow, as being less agitated by wind and weather The best season for angling is from April to October, the best times of the day from three till nine in the morning, and from three till dark in the afternoon

The annexed table contains a useful catalogue of the different fishes that constitute the chief subject of angling, of the places where found, season, time of angling, depth, and baits We extract it from Mr. Daniel's Rural Sports but shall give a more particular description under the several names of the fishes that are most celebrated for amusement

TABLE FOR BAITS.

Names, and where found	Season	Time to angle	Depth from Ground	Baits: Worms	Baits: Flies	Baits: Pastes	Baits: Fish &c
BREAM In rivers: in soft streams in the deepest and broadest parts near weeds where the bottom is clay or sand in ponds in the quietest and deepest parts	From May till Sept.	3 in the morning until 8 and from 5 in the afternoon until dark.	Touch the ground	2,3 7	2. Under water	1 2	8. In June or July
CHUB In angles and deep holes of rivers where the stream is not quick under shade of trees, weeds or hollow banks in a clayey or sandy bottom	From Aug. till March best in winter months	In mild cloudy weather will bite all day, in hot from sun-rise till 9 and from 3 p m till sun-set; in cold the mid of day	In fishing with float in warm weather, at mid water; in cool lower; & in cold at the ground	1,2,4 5 6.	1,2,3,4,5	1 2	7,8,9
BARBEL Middle of pond in rivers during summer, the strongest currents, under bridges near weirs, among piles hollow places and under mossy weeds	From May till Aug	From sun-rise till 10 in the morning, and from 4 p m till sun-set.	Touch ground.	2,7,9, [illegible]		4	
SMELT In docks, and at the stern of ships in tide rivers — to fish at sterns a paternoster line with five or six hooks is to be used	From April till Oct.	All the day; best when the tide runs up	The baits to sink 2 or 3 yards.	1,2,6,9			[illegible] cut in pieces 10. small and unboiled
SALMON Violent streams and large rivers, whilst at feed when off their prey, the deep and broad parts and generally middle of the river near the ground.	From April till Aug	From 6 till 9 in the morning and from 3 p m till sun-set	Touch ground with lob-worm smaller worms, bobs and cad bait at top of the water	7	Large and the more gaudy the better		1
GRAYLING. Clay bottom clear water and swift streams	All the year; chief from Sept. to Jan	All day in cool cloudy weather	Cold weather at bottom in hot weather top or mid water	1 2 3 4 5 6 8 9	1 2,3 4 5 6 7		
GUDGEON. Gravelly sandy ground, and gentle streams	From May till Oct.	All day	Near, or on the ground	2,9			
BLEAK. Sandy bottom deep rivers; at the sides and tails of streams, where the water eddies and turns gently back; ships sterns.	All the year but May when they are spawning	All day	A little deeper than mid-water	[illegible]6 9	1 2 [illegible]	1	
DACE. Sandy bottom, deep rivers; holes well shaded in summer; shallow near fords, under banks, and among weeds	From April to Feb best in winter	All day	3 inches from bottom or at top of the water	1 2 3 6 9	1 2 3 4 5 6 7	5 6	
ROACH. Deep gentle running water; holes that are well shaded having fine gravel or sandy bottom; ships sterns; bridges.	From July till March best in Feb	In mild cloudy weather all day in hot morn & eve in cold the mid of day	1 inch from bottom	1 2 3 4 5 6 [illegible]	1 2 4 7 Under water	1 5 6	8
PERCH. In rivers: gentle streams not over deep, where there are weeds, hollow banks, and at gravelly bottoms. In ponds: deep holes, near weeds or stumps of trees.	From April till Jan	Sun-rise till 10; from 2 till sun-set; if weather be cloudy with ruffling south wind will bite all day	Mid water or 6 inches from bottom	1 2,6,8 9			1 [illegible]
POPE Deep still water	May to Oct	All day	[illegible] inches from bottom	9			
CARP Still deep muddy bottom, pond or river	Mar to Aug	Early and late as possible	3 inch from bottom mid water in hot weather	1 [illegible] 3 4 8.		3,[illegible]	
TENCH River or pond, among weeds, muddy bottom	From Sept till June	Early and late as possible	6 inches from bottom among weeds at deep mid water in hot weather	1 2 4 [illegible]		[illegible]	
TROUT Swift clean rivers over pebbles, stony bottoms.	Mar to Michaelmas	All day	Cold weather 6 inch to [illegible] from bottom in hot top to mid water	1 3 [illegible] 8 [illegible]	1 2 3 4,5 6 7		1 [illegible] 9
PIKE. Sandy or clay bottoms, under bull rushes, weeds, water-docks, or bushes.	From May till Feb	With a gentle gale all day	Mid water, if with a float and single snap-hook				1 3 4 [illegible]
EEL. Among weeds, under roots and holes in banks and stones at bottom, about bridges weirs and mills	From May till Sept	All day when the water is thick by rains	On the ground	4 7			1 [illegible]

Description of Bobs and Worms

1 *Earth Bob* found in sandy or light ground after the plough the rooks will direct where this grub is to be met with by their close attendance on the plough is white bigger than a gentle with a red head Another is found in heathy ground, with a black or blue head [illegible] ther of these are to be got by digging one spit deep in the abovementioned soils where they have long remained unploughed Keep them in an earthen vessel well covered with a sufficient quantity of the mould they harbour in with dryish moss at top and let them be in a warm place, are excellent from the beginning of November to the middle of April

[illegible] to be had from putrid flesh let them be put into wheat bran two or three days [illegible]

3. [illegible] found amongst roots of flags [illegible] longer and thinner than a gentle [illegible] the cad bait

4. [illegible] found in the [illegible] cells [illegible] before using, put them into an oven after the bread is drawn or dry them on a tile before the fire, just to harden and make them tough.

5 *Cow-dung Bob* [illegible] found under a cow-drop from May to Michaelmas, is larger [illegible] like a gentle [illegible] earth, as number [illegible]

6. *[illegible] Worm or [illegible]* found under loose stones in shallow rivers or brooks, are covered with husks of sticks, straw, rushes, and stones; they are yellow bigger than a gentle, with a black or blue head. Keep them in linen [illegible] [illegible] and dip them bag and all into water once a day for five or six days, they will then become tough and fitter for angling than when first taken from the water

7 *Lob or Dew Worm* found in gardens is very large having a red head, a streak down the back and a broad flat tail those with a knot are fit only for eels

8 *Marsh Worm* found in marshy ground are of a blueish colour and require more scouring [illegible] than most other worms are a good bait from March to Michaelmas

9 *Brandling Red or Blood Worm* found in rotten dunghills and tanner's bark that has been used The red worm found at the root of a great dock and which lies wrapt up in a round clue is a particular bait for *bream* The common red worm is very good for all small fish

Flies where found

1 *Stone Fly* under hollow stones at the sides of rivers is of a brown colour with yellow streaks on the back and belly has large wings In season from April to July

2. *Green Drake* among stones by rivers sides, has a yellow body ribbed with green, is long and slender his wings like a butterfly & his tail turns on his back Very good from May to Midsummer

3 *Oak Fly* upon the body of an old oak or ash tree with its head downwards is of a brown colour From May to September Excellent for *trout* in clear water putting a cad bait on the point of the hook and letting it sink a few inches and gradually raising it

4 *Palmer Fly or Worm* upon the leaves of plants, is commonly called a caterpillar when it turns to a fly, very good for *trout*

5 *Ant Fly* in ant-hills From June to September A handful of the earth with as much of the grass that grows on their hillocks put into a glass bottle with the ant flies, will keep them alive

6 *May Fly* playing at the river side especially before rain

7 *Black Fly* upon every hawthorn bush after the buds appear

Mem Artificial Flies may be procured at the shops where fishing tackle is sold Worms of various sorts and other baits, are also generally kept in the season ready prepared for use

Pastes how to be made

1 *Red Paste* the crumb of fine new white bread (without being made wet) worked up in the hand and coloured with vermilion as near as possible to that of the salmon's roe

2 *Brown Paste* the crumb of brown bread mixed with honey worked up in the same manner

3. Blood of a sheep's heart mixed with honey and flour and worked to a proper consistence

4 Old cheese grated, butter sufficient to work it and coloured with saffron if in winter use the fat of racy bacon instead of butter

5 Crumbs of bread worked with honey or sugar and moistened with gum ivy water

6. Bread chewed, and worked in the hand until stiff

Fish and Insects

1	Minnow	6	Yellow Frog
2	Gudgeon	7	Snail slit
3	Roach	8	Grasshopper
4	Dace	9	Beetle
5	Smelt	10	Shrimp

In the middle of March, till which time no man should catch a trout, or in April, if the weather be dark, or a little windy or cloudy, the best fishing is with the palmer worm; but of this there are divers kinds, or at least of divers colours; the palmer-worm and the may-fly are the ground of all fly-angling; they are to be thus made

First, arm your hook with the line in the inside of it, then take your scissars, and cut as much of a brown mallard's feather as will make its wings, having regard to the size of your hook; lay the outmost part of your feather next your hook, then the point of the feather next the shank of your hook, and having so done, whip it three or four times about the hook with the same silk with which your hook was armed, and having made the silk fast, tack the hackle of a cock or capon's neck, or a plover's top, which is usually better strip off the one side of the feather, and then take the hackle, silk, or crewel, gold or silver thread, make these fast at the bent of the hook, or below your arming; then take the hackle, the silver or gold thread and work it up to the wings, shifting or still removing your finger, as you turn the silk about the hook, and still looking at every stop or turn, that your gold, or what materials soever you may make your fly of, lie right and neatly, and if you find they do so, when you have formed the head, make all fast then work your hackle up to the head, and make that fast, and with a needle or pin divide the wing into two, with the arming silk whip it about cross-ways betwixt the wings, and with your thumb turn the point of the feather towards the bent of the hook, and work three or four times about its shank, view the proportion, and if all be neat and to your liking, fasten the silk

No direction, however, can make a man of a dull capacity work a fly well, and yet these rules with a little practice, will help an ingenious angler in a good degree but to see a fly made by an artist is the best mode of learning, and then an ingenious angler may walk by the river side, and mark whatever flies fall on the water that day, and catch one of them, if he see the trout leap at a fly of that kind, and having always hooks ready hung with him, and a bag also with him, with bear's hair, or the hair of a brown heifer hackles of a cock or capon, several coloured silks, and crewel to make the body of the fly, the feathers of a drake's head, black or brown sheep's wool, or hog's wool, or hair, thread of gold and of silver, silk of several colours, especially sad coloured, to make the fly's head, having these with him in a bag, he may imitate and hit off the fly to a perfection that none can well teach him; and if he have the luck to hit also where there is store of trouts, a dark day, and a right wind, he will catch such numbers of them as will encourage him to grow more and more in love with the art of fly-making

Let him not fail then to be provided with bear's hair of divers colours, as grey, dun, light and dark coloured, bright brown, and that which shines also camel's hair, dark, light, and of a colour between both badger's hair, or fur spaniel's hair from behind the ear, light and dark brown, blackish and black hog's down, which may be had about Christmas of butchers, or rather of those that make brawn, it should be plucked from under the throat, and other soft places of the hog, and must be of the following colours, viz black, red, whitish, and sandy, and for other colours, you may get them dyed at a dyer's; seal's fur is to be had at the trunk-maker's, get this also dyed of the colours of cow's and calf's hair, in all the different shades, from the light to the darkest brown, cow's or calf's hair are harsh, and will never work kindly, nor lie handsomely get mohairs, black, blue, purple, white, violet, Isabella, which colour is described as of a bright gold colour purple, philomot, from feuille morte, a dead leaf, yellow and orange camlets, both hair and worsted, blue, yellow, dun, light and dark brown, red, violet, purple, black, horse-flesh, pink, and orange colours Some recommend the hair of abortive colts and calves, but seal's fur, dyed as above, is much better

A piece of an old Turkey carpet will furnish excellent dubbing, untwist the yarn, and pick out the wool, carefully separating the different colours, and lay it by

Some use for dubbing barge sail, concerning which we observe that the sails of west country and other barges, when old, are usually converted into tilts, under which there is almost a continual smoke arising from the fire and the steam of the beef-kettle which all such barges carry, and which, in time, dyes the tilt of a fine brown, this would be excellent dubbing, but that the material of these sails is sheep's wool, which soaks in the water, and soon becomes very heavy however, get of this as many different shades as you can, and have seal's fur and hog wool dyed to match them, which, as they are more turgid, stiff, and light, and so float better, are in most cases to be preferred to worsted, crewels, and indeed to every other kind of wool, and observe that the hog-wool is best for large, and the seal's fur for small flies

Get also furs of the following animals, viz the squirrel, particularly from his tail, fox cub, from the tail, where it is downy and of an ash colour, an old fox, an old otter, otter cub, badger, fulimart, or filmart, a hare, from the neck, where it is of the colour of withered fern, and, above all, the yellow fur of the marten, from the gills or spots under the jaws. All these, and almost every other kind of fur, are easily got at the furrier's

Hackles are a very important article in fly-making they are the long slender feathers that hang from the head of a cock down his neck, there may also be fine ones got from near the tail be careful that they are not too rank, which they are when the fibres are more than half an inch long, and for some purposes these

are much too big be provided with those of the following colours, viz red, dun, yellowish, white, orange, and perfect black, and whenever you meet, alive or dead, with a cock of the game breed, whose hackle is of a strong brown-red, never fail to buy him, but observe that the feathers of a cock chicken, be they ever so fine for shape and colour, are good for little, for they are too downy and weak to stand erect after they are once wet, as are also those of the Bantam cock

Feathers are absolutely necessary for the wings and other parts of flies, get therefore feathers from the back and other parts of the wild mallard, or drake, the feathers of a partridge, especially those red ones that are in the tail, feathers from a cock pheasant s breast and tail, the wings of a blackbird, a brown hen, of a starling, a jay, a land-rail, throstle, a fieldfare, and a water coot, the feathers from the crown of the pewit, plover, or lapwing, green and copper-coloured peacock s and black ostrich herle, feathers from a heron s neck and wings; and remember, that in most instances, where the drake's or wild mallard s feather is hereafter directed, that from a starling s wings will do much better, as being of a finer grain, and less spungy

Be provided with marking silk of all colours, fine but very strong, flaw silk, gold and silver flatted wire or twist, a sharp knife, hooks of all sizes, hog s bristles for loops to your flies, shoemaker's wax, a large needle to raise your dubbing when flatted with working, and a small but sharp pair of scissars

The use of a bag is attended with many inconveniences, of which, the mixing and wasting your materials are not the least to prevent which the following method is recommended take a piece of fine grained parchment, of seven inches by nine, and fold it so that the size and proportion of it will be that of a small octavo volume, then open it, and through the first leaf, with a sharp penknife and ruler, make three cross cuts, at the same proportionable distance as those in pl XC fig 1 and with a needle and silk stitch the two leaves together, as in that figure, let each of the margins be half an inch at least

Then with a pair of compasses, take the distance from A to B, and set it in the middle of a small piece of parchment, and likewise set on the same distance to the right and left, and at each extremity cut off, with a penknife and ruler, the square parchment, observing that the sides are exactly parallel

At about a quarter of an inch from the top, make a cut through the first and third divisions, and with a pair of scissars snip out the loose pieces

Then set on the distance from A to C, and cut as before, leaving the middle division an inch longer at bottom than the others when this is done, your parchment will have the shape and proportion of fig 2, and you may cut the upper flap as it appears there

Be careful that the cuts, and indeed all your work, be exactly square, and then turn in the sides and ends of the parchment, so cut as before, and press the folds with a folding stick, and you will have one pocket, shaped as fig 3, which put into the first partition

Pursue the same method with the same pockets, and those for the other partitions, and in this manner proceed till you have completed six leaves, which are to make the first of your book, the larger of these pockets are to hold hog s wool, seal s fur, and bear s hair, and the smaller the finer furs, which are those of the marten, fox cub, &c

In each of the six divisions, in every leaf, with a sadler s hollow punch, make a hole, to which end take a thin narrow stick of beech, or any hardish wood, and, when the pocket is in its place, put the stick down into the pocket, and, observing the centre of the division, give the punch a smart blow with a mallet, these holes will show what is contained in each of the pockets

The next leaf may be single, stitch it across with double silk diagonally, and cross those stitches with others, and the spaces will be of a lozenge shape let the stitches be half an inch in length, into these you are to tuck your dubbing, when mixed ready for use

The next leaf should be double, stitched with a margin as the others, and through the first fold cut a lozenge, as big as the size will allow of, into this you may tuck three or four wings of small birds, as the starling, land rail, throstle, &c At the back of this leaf sew two little parchment straps, of half an inch wide, very strong, through which put a small but very neat and sharp pair of scissar

You may, on another single leaf, make four or five cross bars of long stitches, through which, as well on the back as the fore side, you may put large feathers, namely, those of a cock pheasant s tail, a ruddy brown hen, &c

The next three leaves should be double, stitch them through the middle, from side to side, and with the compasses describe a circle of about an inch and a half diameter, cut out the parchment within the circle, under some of the margins, when leaves are stitched together, tuck peacock s and ostrich herle, and in others lay neatly the golden feathers of a pheasant's breast, and the grey and dyed yellow mail of a mallard

Three double leaves more, with only two large pockets in each, may be allotted for silk of various colours, gold and silver twist, and other things, six single leaves in addition will complete your book, stitch them from side to side with distances of half an inch, and cross those stitches with others, from top to bottom with somewhat greater distances, and into every other space, reckoning from top to bottom, lay neatly and smoothly a starling s feather, do the same on the backside, and so for two leaves

The remaining leaves you may fill with land-rail's and other small feathers, plover's tops, and red and black hackles.

The first and last leaves of your book may be double, stitched in the middle, from side to side, but open at the edges which will leave you four pockets like those of a common pocket-book, into which you may put hooks, and a small piece of wax, wrapped in a bit of glove leather

To the page that contains the mixed dubbings, there should be an index, referring to every division contained in it, and expressing what fly each mixture is for

When your book is thus prepared, send it to the binder, with directions to bind it as strong as possible, let him leave a flap to one of the boards, and fasten to it a yard of ribband to tie it

The utility and manifold conveniences of a book are apparent, and whoever will be at the pains of making such a one as this, will find it far preferable to a magazine-bag

In general we shall give the different methods of angling under the names of the different fishes angled for we shall nevertheless offer in the present article, a few observations upon those more commonly sought after

The PIKE loves a still, shady, unfrequented water, and usually lies amongst or near weeds, such as flags, bulrushes, candocks, reeds, or in the green fog that sometimes covers standing waters, though he will occasionally shoot out into the clear stream He is caught variously at the top and in the middle, and often, especially in cold weather, at the bottom of the river

Pikes are called jacks till they become twenty-four inches long

The bait for pikes besides those mentioned under the article PIKE, are a small trout, the loche and miller s thumb, the head end of an eel, with the skin taken off below the fins, a small jack, a lob-worm and, in winter, the fat of bacon And notwithstanding what some say against baiting with a perch, it is confidently asserted, that pikes have been taken with a small perch, when neither a roach or bleak would tempt them

All your baits for pikes must be as fresh as possible Living baits you may take in a tin kettle, changing the water often, and dead ones should be carried in fresh bran which will dry up the moisture that otherwise would rot them

Pikes are angled for in two ways by the troll, and for the snap In trolling, the head of the bait-fish must be at the bent of the hook, but, in fishing at the snap, the hook must come out at or near the tail The essential difference, however, between these two methods is, that in the former the pike is always suffered to pouch or swallow the bait, but in the latter you are to strike as soon as he has taken it

The rod for trolling should be about three yards and a half long, with a ring at the top for the line to run through, you may fit a trolling-top to your fly-rod, which needs only to be stronger than the common fly-top

Let your line be of green or sky-coloured silk, thirty yards in length, which will make it necessary to use the winch, with a swivel at the end

The common trolling-hook for a living bait consists of two large hooks, with a common shank, made of one piece of wire, of about three quarters of an inch long, placed back to back, so that the points may not stand in a right line, but incline so much inwards as that the shank may form an angle little less than equilateral At the top of the shank is a loop left in bending the wire, to make the hook double, through which is put a strong twisted brass wire of about six inches long, and to this is looped another such link but both so loose that the hook and the lower link may have room to play to the end of the line fasten a steel swivel

But there is a sort of trolling-hook different from this, and which is thought preferable, which will require another management this is no other than two single hooks tied back to back with a strong piece of gimp between the shanks, in whipping the hooks and the gimp together, make a small loop, and take into it two links of chain of about an eighth of an inch diameter, and into the lower link, by means of a small staple of wire, fasten, at the greater end, a bit of lead of a conical figure, and somewhat sharp at the point These hooks are to be had at the fishing tackle shops, ready fitted up, but for the form of them, see pl XC. fig 5

This latter kind of hook is to be thus ordered, viz put the lead into the mouth of the bait-fish, and sew it up the fish will live some time, and though the weight of the lead will keep his head down, he will swim with nearly the same ease as if at liberty

If you troll with a dead bait, use the following hook

Let the shank be about six inches long, and leaded from the middle as low as the bent of the hook, to which a piece of very strong gimp must be fastened by a staple, and two links of chain, the shank must be barbed like a dart, and the lead a quarter of an inch square the barb of the shank must stand like the fluke of an anchor, which is placed in a contrary direction to that of the stock, see fig 6 Let the gimp be about a foot long, and to the end fix a swivel to bait it, thrust the barb of the shank into the mouth of the bait-fish, and bring it out at the side near the tail when the barb is thus brought through, it cannot return, and the fish will lie perfectly straight, a circumstance that renders the trouble of tying the tail unnecessary

There is yet another sort of trolling-hook, which is, either single or double, with a long shank, leaded about three inches up the wire with a piece of lead about a quarter of an inch square at the greater or lower end, fix to the shank an armed wire about eight inches long to bait this hook thrust your wire into the mouth of the fish, quite through his belly, and

out at his tail, placing the wire so as that the point of the hook may be even with the belly of the bait fish, and then tie the tail of the fish with strong thread, to the wire, some fasten it with a needle and thread, which is a neater way

Both with the troll and at the snap, cut away one of the fins of the bait-fish close at the gills, and another behind the vent on the contrary side, which will make it play the better

The bait, being thus fixed, is to be thrown into and kept in constant motion in the water, sometimes suffered to sink, then gradually raised, now drawn with the stream, and then against it, so as to counterfeit the motion of a small fish in swimming If a pike be near, he mistakes the bait for a living fish, seizes it with prodigious greediness, goes off with it to his hold, and in about ten minutes pouches it When he has thus swallowed the bait, you will see the line move, which is the signal for striking him, do this with two powerful jerks, and then play him

The other way of taking pike, viz with the snap, is as follows

Let the rod be twelve feet long, very strong and taper, with a strong loop at the top to fasten your line to, your line must be about 1 foot shorter than the rod, and much stronger than the trolling line

And here it is necessary to be remembered, that there are two ways of snapping for pike, viz with the live and with the dead snap For the former, there is no kind of hook so proper as the double spring hook, a double form of which is given in the plates, fig 7 and 8 To bait it, nothing more is necessary than to hang the bait fish fast by the back fin to the middle hook, where he will live a long time

Of hooks for the dead snap there are many kinds Fig 9 of plate XC is a representation of one, which, after repeated trials, has been found to excel all others hitherto known, the description and use of it is as follows, viz Whip two hooks, of about three eighths of an inch in the bent, to a piece of gimp, in the manner directed for the trolling-hook, a view of which is given in the plate, fig 5 Then take a piece of lead, of the same size and figure as directed for the trolling hook, and drill a hole through it from end to end to bait it, take a long needle, or wire, enter it in at the side, about half an inch above the tail, and with it pass the gimp between the skin and the ribs of the fish, bring it out at its mouth, then put the lead over the gimp, draw it down into the fish's throat, and press his mouth close, and then, having a swivel to your line, hang on the gimp

In throwing the bait, observe the rules given for trolling, but remember that the more you keep it in motion, the nearer it resembles a living fish

When you have a bite, strike immediately the contrary way to that which the head of the pike lies, or to which he goes with the bait, if you cannot find which way his head lies, strike upright with two smart jerks, retiring backwards as fast as you can, till you have brought him to a landing-place, and then do as before directed

As the pike spawns in March, and before that month rivers are seldom in order for fishing, it will hardly be worth while to begin trolling till April; afterwards, however, the weeds will be apt to be troublesome But the prime month in the year for trolling is October, when the pike is fattened by the summer's feed, the weeds are rotted, and by the falling of the waters the harbours of the fish are easily found

Prefer to troll in clear, and not muddy water, and in windy weather if the wind be not easterly

Some use in trolling and snapping two or more swivels to their line, by means of which the twisting of the line is prevented, the bait plays more freely, and, though dead, is made to appear as if alive, which in rivers is doubtless an excellent method but those who like to fish in ponds or still waters, will find very little occasion for more than one

The pike is also to be caught with a minnow, for which method take the following directions

Get a single hook, slender, and long in the shank let it resemble the shape of a shepherd's crook, put lead upon it, as thick near the bent as will go into the minnow's mouth, place the point of the hook directly up the face of the fish, let the rod be as long as you can handsomely manage with a line of the same length, cast up and down, and treat it as when you troll with any other bait if when the pike has taken your bait, he run to the end of the line before he hath gorged it, do not strike, but hold still only and he will return back and swallow it This bait is admirable for a troll

In landing a pike great caution is necessary for his bite is esteemed venomous, the best and safest hold you can take of him is by the head, in doing which, place your thumb and finger in his eyes

If you go any great distance from home, you will find it necessary to carry with you many more things than are here enumerated most of which however, may be very well contained in a wicker pannier of about twelve inches wide, and eight high, and put into a hawking bag, of the form of fig 10 The following is a list of the most material ingredients A rod with a spare top, lines coiled up and neatly laid in round flat boxes, spare links, single hairs, waxed thread, and silk, plummets of various sizes, of the form of fig 11 floats of all kinds, and spare caps worm-bags, and a gentle box, see fig 12, hooks of all sizes, some whipped two single hairs, shot, shoemaker's wax, in a very small gallipot covered with a bit of leather, a clearing ring, tied to about six yards of strong cord, of the shape of fig 13 the use of which is to disengage your hook when it has caught a weed, &c in which

case take the butt off your rod, and slip the ring over the remaining joints, and holding it by the cord, let it gently fall, a landing net, whose hoop must be of iron, and made with joints to fold, in the shape of fig 14 and a socket to hold a staff, fig 15 Take with you also such baits as you intend to use That you may keep your fish alive, be provided with a small hoop net to draw close to the top, and never be without a sharp knife and a pair of scissars, and if you mean to use the artificial fly, have your fly book always with you

And for the more convenient keeping and carriage of lines, links, single hairs, &c take a piece of parchment or vellum, seven inches by ten on the longer sides set off four inches, and then fold it cross-wise, so as to leave a slip of two inches, of which hereafter, then take eight or ten pieces of parchment, of seven inches by four put them into the parchment or vellum so folded and sew up the ends, then cut the flap rounding and fold it down like a pocket-book, lastly, bind the ends and round the flap with red tape

Having several of these cases, you may fill them with lines &c proper for every kind of fishing, always remembering to put into each of them a gorger, or small piece of cane, of five inches long, and a quarter of an inch wide, with a notch at each end, with this, when a fish has gorged your hook, you may, by putting it down his throat till you feel the hook, and holding the line tight while you press it down, easily disengage it

If you chance to break your rod proceed as follows to mend it cut the two broken ends with a long slope so that they fit neatly together, then spread some wax very thin on each slope, and with waxed thread or silk, according as the size of the broken part requires, bind them very neatly together to fasten off lay the fore-finger of your left hand over the binding, and with your right, make four turns of the thread over it, then pass the end of your thread between the under side of your finger and rod, and draw your finger away lastly, with the fore finger and thumb of your right hand, take hold of the first of the turns, and gathering as much of it as you can, bind on till the three remaining turns are wound off, and then take hold of the end, which you had before put through, and draw close: see fig 16; 17

For whipping on a hook take the following directions Place the hook betwixt the fore finger and thumb of your left hand, and, with your right, give the waxed silk three or four turns round the shank of the hook then lay the end of the hair on the inside of the shank, and with your right hand whip down, as in fig 18 , when you are within four turns of the bent of the hook, take the shank between the fore finger and thumb of your left hand, and place the end of the silk close by it, holding them both tight, and leaving the end to hang down, then draw the other part of the silk into a large loop, and, with your right hand turning backwards, as in fig 19 continue the whipping for four turns, and draw the end of the silk, which has all this while hung down under the root of your left thumb, close, and twitch it off

To tie a water knot, lay the end of one of your hairs about five inches, or less, over that of the other, and through the loop, which you would make to tie them in the common way, pass the long and the short end of the hairs, which will lie to the right of the loop, twice, and wetting the knot with your tongue, draw it close, and cut off the spare hair see fig 20

The straw-worm, or ruff-coat, is the most common of any, and is found in the river Colne, near Uxbridge, the New River, near London, the Wandle, which runs through Carshalton in Surry, and in most other rivers

To preserve cadies, grashoppers, caterpillars, oak-worms, or natural flies, the following is an excellent method: cut a round bough of fine green barked withy, about the thickness of one's arm, and taking off the bark about a foot in length, turn both ends together, into the form of a hoop, and fasten them with a pack-needle and thread, then stop up the bottom with a bung-cork into this put your baits, tie it over with a colewort-leaf, and with a red-hot wire bore the bark full of holes, see fig 21, pl XCI and lay it in the grass every night, in this manner cadies may be kept till they turn to flies To grashoppers you may put grass

One of the insects last described was found in the river Wandle in Surry, it was put into a small box, with sand in the bottom, and was wetted five or six times a-day, for five days, at the end of which, it produced a fine large fly, nearly of the shape of, but less than, a common white-butterfly, with two pair of cloak wings, and of a light cinnamon colour

For your float, in slow streams, a neat round goose quill is proper, but for deep or rapid rivers, or in an eddy, the cork, shaped like a pear, is indisputably the best, which should not, in general, exceed the size of a nutmeg, let not the quill, which you put through it, be more than half an inch above and below the cork, and this float, though some prefer a swan's quill, has great advantage over a bare quill, for the quill, being defended from the water by the cork, does not soften, while the cork enables you to lead your line so heavily, as that the hook sinks almost as soon as you put it into the water, whereas when you lead but lightly, it does not get to the bottom till it is near the end of your swim See the form of the float, pl XCI fig 27 and in leading your line, be careful to balance them so nicely, that a very small touch will sink them, some use for this purpose lead shaped like a barley-corn, but there is nothing better to lead with than shot, which you must have ready cleft always with you, remembering, that when you fish fine, it is better to have on your line a great number of small than a few large shot

Whip the end of the quill round the plug

with fine silk, well waxed, this will keep the water out of your float, and preserve it greatly.

In fishing with a float, your line must be about a foot shorter than your rod; for if it be longer, you cannot so well command your hook when you come to disengage the fish.

PERCH and CHUB are caught with a float, and also GUDGEONS, and sometimes BARBEL and GRAYLING.

For CARP and TENCH, which are seldom caught but in ponds, use a very small goose or a duck-quill float, and throw in every now and then a bit of chewed bread.

Some choose to make their own LINES, in which case, if they prefer those twisted with the fingers, they need only observe the rules given in the article for that purpose: but for greater neatness and expedition an engine is preferable, which is to be had at almost any fishing-tackle shop in London. It consists of a large horizontal wheel, and three very small ones, inclosed in a brass box about a quarter of an inch thick, and two inches in diameter: the axis of each of the small wheels is continued through the under side of the box, and is formed into a hook; by means of a strong screw it may be fixed in any post or partition, and is set in motion by a small winch in the centre of the box.

To twist links with this engine, take as many hairs as you intend each shall consist of, and, dividing them into three parts, tie each parcel to a bit of fine twine, about six inches long, doubled, and put through the hooks: then take a piece of lead, of a conical figure, two inches high, and two in diameter at the base, with a hook at the apex, or point; tie your three parcels of hair into one knot, and to this, by the hook, hang the weight.

Lastly, take a quart or larger bottle cork, and cut into the sides, at equal distances, three grooves, and placing it so as to receive each division of hair, begin to twist: you will find the link begin to twist with great evenness at the lead; as it grows tighter, shift the cork a little upwards, and when the whole is sufficiently twisted, take out the cork, and tie the link into a knot, and so proceed till you have twisted links sufficient for your line, observing to lessen the number of hairs in each link in such proportion as that the line may be taper. See the engine, pl. XCI. fig. 28. 29. is the form of the cork.

When you use the fly, you will find it necessary to continue your line to a greater degree of fineness, in order to which, supposing the line to be eight yards in length, fasten a piece of three or four twisted links tapering, till it become of the size of a fine grass, and to the end of this fix your hook-line, which should be either of very fine grass, or silk-worm gut. A week's practice will enable a learner to throw one of these links, and he may lengthen it, by a yard at a time, at the greater end, till he can throw fifteen yards neatly; till when he is to reckon himself but a novice.

As to the colour, be determined by that of the river you fish in; but a line of the colour of pepper and salt, when mixed, will suit any water.

Many inconveniencies attend the use of twisted hairs for your hook line; silk-worm gut is both fine and very strong, but then it is apt to fray, though this may in some measure be prevented by waxing it well.

Indian or sea grass makes excellent hook-lines, and though some object to it as being apt to grow brittle, and to kink in using, with proper management it is the best material for the purpose yet known, especially if ordered in the following manner.

Take as many of the finest you can get as you please, put them into a vessel, and pour thereon the scummed fat of a pot wherein fresh but by no means salt meat has been boiled; when they have lain three or four hours take them out one by one, and strip the grease off with your finger and thumb, but do not wipe them; stretch each grass as long as it will yield, coil them up in rings, and lay them by; and you will find them become nearly as small, full, and round, and much stronger than the best single hairs you can get. To preserve them moist, keep them in a piece of bladder well oiled, and before you use them let them soak about half an hour in water; or, in your walk to the river side, put a length of it into your mouth.

If your grass be coarse, it will fall heavily in the water, and scare away the fish; on which account, gut has the advantage. But after all, if your grass be fine and round, it is the best thing you can use.

Supposing you would make the palmer-hackle or palmer, which are terms of the same import, the method of doing it is as follows.

Hold your hook in a horizontal position, with the shank downward, and the bent of it between the fore finger and thumb of your left hand; and having a fine bristle and other materials lying by you, take half a yard of fine red marking silk, well waxed, and, with your right hand, give it four or five turns round the shank of the hook, inclining the turns to the right hand; when you are near the end of the shank, turn into such a loop for fastening off, and draw it tight, leaving the ends of the silk to hang down at each end of the hook. Having singed the end of your bristle, lay it along on the inside of the shank of the hook, as low as the bent, and whip four or five times round; then singeing the other end of the bristle to a fit length, turn it over to the back of the shank, and, pinching it into a proper form, whip down and fasten off, as before directed, which will bring both ends of the silk into the bent. After you have waxed your silk again, take three or four strands of an ostrich feather, and holding them, and the bent of the hook as at first directed, the feathers to your left hand, and the roots in the bent of your hook, with that end of the silk you just now waxed, whip them three or four times round, and fasten off: then

turning the feathers to the right, and twisting them and the silk with your fore finger and thumb, wind them round the shank of the hook, still supplying the short strands with new ones, as you fail, till you come to the end, and fasten off When you have so done, clip off the palmer small at the extremities, and full in the middle, and wax both ends of your silk, which are now divided, and lie at either end of the hook

Lay your work by, and taking a strong bold hackle, with fibres about half an inch long, straighten the stem very carefully, and holding the small end between the fore finger and thumb of your left-hand with those of the right stroke the fibres the contrary way to that which they naturally lie and taking the hook, and holding it as before, lay the point of the hackle into the bent of the hook, with the hollow which is the palest side, upwards and whip it very fast to its place, in doing which be careful not to tie in many of the fibres or if you should chance to do so pick them out with the point of a very large needle

When the hackle is thus made fast, the utmost care and nicety is necessary in winding it on for if you fail in this, your fly is spoiled, and you must begin all again to prevent which, keeping the hollow or pale side to your left hand, and, as much as possible the side of the stem down on the dubbing wind the hackle twice round, and holding fast what you have so wound, pick out the loose fibres which you may have taken in, and make another turn [illegible] then lay hold of the hackle with the [illegible] and fourth fingers of your left hand [illegible] you may extend it while you [illegible] loose fibres as before

In this manner proceed till you [illegible] within an eighth of an inch of the [illegible], where you will find an end of all h[illegible] ng [illegible] by which time you will find the fibres at the great end of the hackle somewhat discomposed, clip these off close to the stem and, with the end of your middle finger press the stem close to the hook, while, with the fore [illegible] of your right-hand you turn the silk into a loop which when you have twice put over the end of the shank of the hook, loop, and all your work is safe

Then wax that end of the silk which you now used, and turn it over as before, till you have taken up nearly all that remained of the hook, observing to lay the turns neatly side by side, and lastly, clip off the ends of the silk thus will you have made a bait that will catch trout of the largest size in any water in England

And lest the method of fastening off, which occurs so often in this kind of work, should not appear sufficiently intelligible, the reader will see it represented in pl XCI fig 30

It is true, the method above described will require some variations in the case of gold and silver-twist palmers, in the making of which, the management of the twist is to be considered as another operation but this variation will suggest itself to every reader, as will also the method of making those flies that have hackle under the wings

As the foregoing directions mention only the materials for making the several flies, the reader may yet be at a loss both with respect to their form and size, on which account, in plate XCI we have given the five, which may be considered as radical flies, they are, the palmer, pl XCI fig 22 the green-drake, 23 the dun-cut, 24 the hawthorn-fly, 25 and the ant fly, 26 The two first are distinct species, the third is a horned fly, the fourth has hackle under its wings and the fifth, as most flies of the ant-kind have, has a large bottle-tail, and to one or other of these figures, it is imagined, all flies are reducible

In adjusting their different sizes, it must be owned there is great difficulty, all that can be said is that the figures 22 and 23 exhibit the usual si[illegible] of the palmer the green and grey drake [illegible] 24, may serve as a specimen for most flies that are not directed to be made large, and when directions are given to make the fly small, the reader is to consider fig 25 as an example

Gnats cannot be made too small

Some, in making a fly, work it upon, and fasten it immediately to, the hook-link, whether it be of gut, grass, or hair others whip on the shank of the hook a stiff hog's bristle bent into [illegible] concerning these methods there are different opinions

The latter, howev[illegible] except for small flies, seems the more eligible way, and has this advantage that it enables you to [illegible]ep your [illegible] in order to do which, string each [illegible] separately through the loops, upon [illegible] of about seven inches [illegible] through a large [illegible] with the name of the fly written on it, tie the [illegible] and lay them in round flat boxes, with paper between each ring, and when you [illegible] them, having a neat loop at the lower end of your hook-line, you may put them on and take them off at pleasure

In the other method we are troubled with a great length of hook-link, which, if we put but few flies together, is sure to entangle, and occasion great trouble and loss of time And as to an objection which some make to a loop, that the fish sees it, and therefore will not take the fly, there is nothing whatever in it See further upon this subject, GROUND ANGLING GROUND BAIT, GROUND PLUMBING

When you have hooked a fish, never suffer him to run out with the line, but keep your rod bent, and as near perpendicular as you can by this method the top plies to every pull he makes, and you prevent the straining of your line for the same reason,

Never raise a large fish out of the water by taking the hair to which your hook is fastened, or indeed any part of the line, into your hand but either put a landing net under him, or, for want of that, your hat you may indeed, in fly-fishing, lay hold of your line to draw a fish to you, but this must be done with caution

Your silk for whipping hooks and other fine work must be very small, use it double, and wax it, and indeed any other kind of binding, with shoemaker's wax, which of all waxes is the toughest, and holds best if your wax be too stiff, temper it with tallow

If for strong fishing you use grass, which, when you can get it fine, is to be preferred to gut, remember always to soak it about an hour in water this will make it tough, and prevent its kinking

Whenever you begin to fish, wet the end of the joints of your rod, which, as it makes them swell, will prevent their loosening And, if you happen with rain or otherwise to wet your rod, so that you cannot pull the joints asunder, turn the ferrule a few times round in the flame of a candle, and they will easily separate

Before you fix the loop of bristle to your hook, in order to make a fly, to prevent its drawing, singe the ends of it in the flame of a candle, do the same by the hair, to which at any time you whip a hook

Be always neat in your tackle, and provided with plummets, a knife, different kinds of hooks, floats, and a few shots, or any thing else you ought to be furnished with, before you set out for your recreation

In a pond it is best to angle near the ford where the cattle go to drink, and in rivers in such places where such sort of fish you intend to angle for usually frequent for breams, try in the deepest and quietest parts of the river, for eels, under over-hanging banks, for chub, in deep shaded holes, for perch, in scowers, for roach, in the same place as perch, for trouts, in quick streams, and with a fly upon the stream on the top of the water And if you fish in such places where you can discern the gravelly bottom, conceal yourself as much as possible

In such waters as are pestered with weeds, roots of trees, and such like, fish lie close and warm, and they resort thither in great shoals, and there they will bite freely, but take great care how you cast in the hook, and how you strike a bite, for the least rashness loses hook and line

And as the hook may happen to be entangled, be provided with a ring of lead, about six inches round, fastened to a small pack-thread and in such case thrust the ring over the rod, letting it go into the water, holding fast by the other end of the pack-thread, and work it gently up and down, and it will soon disengage the hook

It is good angling in whirlpools, under bridges, at the falls of mills, and in any place where the water is deep and clear, and not disturbed with wind or weather

The best times are from April to October, for in cold, stormy and windy weather, the fish will not bite, and the best times in the day are from three till nine in the morning, and from three in the afternoon till sun-set

If the wind be easterly, it will be in vain to go to angle, but you may angle well enough if it blow from any other point, provided it do not blow hard, but it is best in a southerly wind, and a close, lowering, warm day, with a gentle breeze, and after a sudden shower to disturb the water, at which time the fish will best rise at the fly, and bite eagerly, and the cooler the weather is in the hottest month, the better it is

In winter all weathers and all times are much alike, only the warmest are the best

It is very good angling a little before fishes spawn, for then, their bellies being full, they frequent sandy fords to rub and loosen them, at which time they will bite freely

It is also very good angling in a dull, cloudy day, after a clear moon shiny night, for in such nights they are fearful to stir to get food, lying close, so that being hungry the next day they will bite boldly and eagerly

At the opening of sluices and mill-dams, if you go with the course of the water you can hardly miss of fishes that swim up the stream to seek for what food the water brings down with it

It is good angling at the ebb, in waters that ebb and flow, but yet the flood is to be preferred, if the tide be not strong For other directions, see article FISHING

To know at any time what bait fishes are willing to take, open the belly of the first you catch, and take out his stomach very tenderly, using a sharp pen knife, and you will discover what he then feeds on The procuring proper baits is not the least part of the angler's skill

The ant fly is to be met with from June to September, and may be kept in a bottle with some earth and the roots of grass from the ant-hills where they are bred They are excellent bait for roach, dace, and chub, if you angle with them under the water about a hand's breadth from the bottom

Every angler has his peculiar haunt Into such place, in order to draw together fishes into such a place, it will be proper once in four or five days to cast in some corn boiled soft, or garbage, or worms chopt to pieces, or grains steeped in blood and dried but for carp and tench, ground malt is the most proper

If you fish in a stream, it will be best to cast in the grain above the hook, down the stream

The best way of angling with the fly is down the river, not up, and in order to obtain a free bite, use such baits as your fish is naturally inclined to, and in such manner as he is accustomed to receive them

If your baits be of paste, for the keeping them on your hook, add a little flax, or wool

The eyes of fishes are good baits for all fish

Angling by hand, is of three sorts The first is performed with a line about half the length of the rod, a good weighty plummet, and three hairs next the hook, which is called a running line, and with one large brandling, or a dew-worm of a moderate size, or two small ones of the first, or any other sort proper for a trout, or indeed almost any worm whatsoever for if a trout be in humour to bite, he will bite at any worm If you fish with two, bait your hook thus

First, run the point of your hook in at the very head of your first worm, and down through his body, till it be past the knot, and then let it out, and strip the worm above the arming, (that you may not bruise it with your fingers) till you have put on the other, by running the point of your hook in below the knot, and upwards through the body, towards his head, till it be just covered with the head, which being done, you are then to slip the first worm down over the arming again, till the knot of both worms meet together.

The second way of angling in hand, and with a running line, is with a line something longer than the former, and with tackle made after the following manner.

At the utmost extremity of your line, where the hook is always placed in all other ways of angling, you are to have a large pistol or carbine bullet, into which the end of your line is to be fastened with a peg or pin even and close with the bullet, and about half a foot above that, a branch of line of two or three handfuls long, or more, for a swift stream, with a hook at the end thereof, baited with some of the above mentioned worms, and another half a foot above that, armed and baited after the same manner, but with another sort of worm, without any lead at all above, by which means you will always certainly find the true bottom in all depths, which with the plummets upon your line above you can never do, your bait always dragging while you are sounding, (which in this way of angling must be continually) by which means you are likely to have more trouble, and perhaps less success. And both these ways of angling at the bottom are most proper for a dark and muddy water, since in such a condition of the stream a man may stand as near as he will, and neither his own shadow nor the nearness of the tackle will hinder his sport.

The third way of angling by hand with a ground bait, and much the best of all, is with a line full as long, or a yard longer, than your rod, with no more than one hair next the hook and for two or three lengths above it, and no more than one small pellet of shot for a plummet, your hook little, your worm of the smallest brandlings, very well scoured, and only one upon the hook at a time, which is thus to be baited. The point of the hook is to be put in at the tag of his tail, and run up his body quite over all the arming, and still strip on an inch, at least, upon the hair, the head and remaining part hanging downwards, and with this line and hook thus baited, you are ever to angle in the streams, always in a clear rather than a troubled water, and always up the river, still casting out your worm before you, with a clean, light, one-handed rod, like an artificial fly, where it will be taken sometimes at the top, or within a very little of the superficies of the water, and almost always before the light plumb can sink it to the bottom, as well on account of the stream, as that you must always keep your worm in motion, by drawing it still back towards you, as if you were angling with a fly.

* Whoever will try this method will find it the best of all others, in a bright water especially, but then his rod must be very light and pliant, and very true and finely made, in which case, with a skilful hand it will succeed beyond expectation, and in a clear stream is undoubtedly the best worm angling for a trout or grayling that any man can make choice of, and the most easy and pleasant to him. And if the angler be of a constitution that will suffer him to wade, and will slip into the tail of a shallow stream to the calf of the leg, or knee, and so keep off the bank, he may take almost any fishes he pleases.

The second way of angling at the bottom is with a cork, or float, and that is also of two sorts. With a worm, or with grub, or caddis.

With a worm, you are to have your line within a foot or a foot and a half as long as your rod, in a dark water, with two, or, if you will, with three, but in a clear water, never with above one hair next the hook, and two, or three, or four, or five lengths above it, and a worm of what size you please, your plumbs fitted to your cork, and your cork to the condition of the river, (that is, to the swiftness or slowness of the stream) and both, when the water is very clear, as fine as you can, and then you are never to bait with more than one of the smaller sorts of brandlings, or if they be very little indeed, you may bait with two, as before directed.

When you angle for a TROUT, you are to do it as deep, that is, as near to the bottom, as you can, provided your bait do not drag, and if it do, a trout will sometimes take it in that posture. If for a grayling, you are to fish further from the bottom, this fish usually swimming nearer the middle of the water and lying always loose. With a grub or caddis you are to angle with the same length of line, or if it be quite as long as your rod it is not the worse, with never above one hair for two or three lengths next the hook, and with the smallest cork, or float, and the least weight of plumb, that the swiftness of your stream will allow, you may also avoid the violence of the current, by angling in the returns of a stream, or the eddies betwixt two streams, which indeed are the most likely places wherein to kill a fish in a stream, either at the top or bottom.

Of grubs for a GRAYLING, the ash grub, which is plump, milk-white, bent round from head to tail, and exceedingly tender, with a red head, or the dock-worm, or the grub of a pale yellow, longer, lanker, and tougher than the other, with rows of feet all down his belly, and a red head, are the best, i. e. for a grayling, because though a trout will take both these, (the ash grub especially) yet he does not do it so freely as the other, and some say they have usually taken two graylings for one trout with this bait, but if they happen to take a trout with it, it was commonly a very good one.

These baits are usually kept in bran, in which an ash grub commonly grows tougher, and will better endure baiting, though he is still so tender that it will be necessary to warp in a piece of stiff hair with your arming, leaving it standing out about a straw's breadth at the head of your hook, so as to keep the grub either from slipping totally off when baited, or at least down to the point of the hook, by which means your arming will be left naked and bare, which is neither so sightly, nor so likely to be taken, though to help that (which will often, however, fall out) you may arm the hook designed for this bait with the whitest horse hair you can get, which itself will resemble and shine like the bait, and consequently will do more good, or less harm, than arming of any other colour

These grubs are to be baited thus The hook is to be put in, under the head, or the chaps of the bait, and guided down the middle of the belly, without suffering it to peep out by the way, for then (the ash grub especially) will issue out water and milk, till nothing but the skin remain, and the bend of the hook will appear black through it, till the point of the hook come so low that the heart of your bait may rest, and stick upon the hair that stands out to hold it, by which means it can neither slip of itself, neither will the force of the stream, nor quick pulling out, upon any mistake, strip it off

Now the caddies or cob bait (which is a sure killing bait, and for the most part surer than any of the other) may be put upon the hook two or three together, and is sometimes (to very great effect) joined to a worm, and sometimes to an artificial fly, to cover the point of the hook but is always to be angled with at bottom (when by itself especially) with the finest tackle, and is for all times in the year, the most holding bait of any, both for trout and grayling See FISHES, and FISHING STREAMS

Private fisheries are protected by the legislature with peculiar care and the laws upon this subject are so numerous and so dispersed, and at the same time so severe, that the reader may perhaps often find it convenient to resort to the following summary of them

By the 5th Elizabeth, c xxi s 2 it is provided, that if any person shall unlawfully break or destroy any head or dam of a fish pond, or shall wrongfully fish therein, with intent to take or kill fish, he shall, on conviction at the assizes or sessions, at the suit of the king, or the party injured, be imprisoned three months, and pay treble damages, and after the expiration of the said three months, shall find sureties for good behaviour for seven years to come

By 31st Henry Eighth, c ii s 2, If any evil-disposed persons shall fish in the day-time, from six in the morning till six in the evening, in any ponds, stews, or moats, with nets, hooks, or bait, against the will of the owners, they shall, on conviction thereof, at the suit of the king, or the party aggrieved, suffer imprisonment for the space of three months, and find security for their good behaviour

By 22d and 23d Charles Second, c xxv s 7, it is enacted, That if any person shall, at any time, use any casting-net, drag net, shove-net, or other net whatever, or any angle, hair, noose, troll, or spear, or shall lay any wears, pots, nets, fish-hooks, or other engines, or shall take any fish by any means whatsoever, in any river, stew, moat, pond, or other water, or shall be aiding thereunto, without the consent of the owner of the water, and be convicted thereof before a justice, by confession, or the oath of one witness, within one month after the offence committed, such offender shall give to the party injured such satisfaction as the justice shall appoint, not exceeding treble damages, and shall, over and above, pay down presently unto the overseers of the poor, such sum, not exceeding 10s as the justice shall think fit and in default of payment the said penalties to be levied by distress, and for want thereof, the offender to be committed to the house of correction, for a term not exceeding one month, unless the party offending enter into a bond, with surety to the party injured, in a sum not exceeding 10l never to offend in like manner

Justices are also authorized to take, cut in pieces, and destroy, all such articles as before recited and adapted to the taking of fish, as may be found in the possession of offenders when taken Persons aggrieved may appeal to the quarter sessions, whose judgment shall be final And by the 4th and 5th William and Mary, it is enacted, That no person (except makers and sellers of nets, owners of a river or fishery, authorized fishermen, and their apprentices) shall keep any net, angle, leap, pike, or other engine for taking of fish

The proprietor of any river or fishery, or persons by them authorized, may seize, and keep to his own use, any engine which shall be found in the custody of any person fishing in any river or fishery, without the consent of the owner or occupier And such owner, occupier, or person authorized by either, sanctioned by the consent of any justice, in the day-time, may search the houses, or other places, of any unqualified person who shall be suspected of having such nets, or other engines in his possession, and the same to seize, and keep to their own use, or cut in pieces and destroy

By the 5th George Third, c xiv s 1, it is enacted, That if any person shall enter into any park or paddock inclosed, or enter into any garden, orchard, or yard, belonging to, or adjoining to, any dwelling-house, wherein shall be any river, pond, moat, or other water, and, by any means whatsoever (without the consent of the owner,) steal, kill, or destroy, any fish, bred, kept, or preserved therein, or shall be assisting therein, or shall receive or buy any such fish, knowing them to be such, shall, upon conviction, be transported for seven years Persons making confession of such offence, and

giving evidence against an accomplice, who, in pursuance thereof, shall be convicted, will be entitled to a free pardon.

And by the same act, s. 3, *it is enacted*, That if any person shall take, kill, or destroy, or attempt to take, kill, or destroy, any fish in any river or stream, pool, pond, or other water, (not being in any park or paddock enclosed, or in any garden, orchard, or yard, belonging or adjoining to a dwelling-house, but in any other enclosed ground, being private property,) such person being thereof convicted by confession, or the oath of one witness before a justice, shall forfeit five pounds to the owner of the fishery of such river or other water, and in default thereof, shall be committed to the house of correction for a time not exceeding six months.

Stealing fish in disguise is made felony by the 9th George the First, c. xxii. If any person armed and disguised, shall unlawfully steal, or take away any fish, out of any river, or pond, or (whether armed or not) shall unlawfully and maliciously break down the head or mound of any fish pond, whereby the fish shall be lost and destroyed, or shall rescue any person in custody for any such offence, or procure any other to join him therein, he shall be guilty of felony without benefit of clergy.

ANGLO-CALVINISTS, the calvinists of the church of England.

ANGLO-SAXON, an appellation given to the language spoken by the English Saxons, in contradistinction from the true Saxon, as well as from the modern English.

ANGLO-SAXON versions of the New Testament are extant in MS. and a copious account is given of them in Le Long's Bibliotheca Sacra.

ANGOLA, a kingdom of Congo, in Africa. The soil is fruitful, producing Indian corn, beans, oranges, lemons, and several other fruits. The inhabitants are, in general, idolaters. The Portuguese have several colonies and settlements on the coast. The English and Dutch, however, trade with the natives, and purchase great many slaves.

ANGONE (αγχονη, from αγχω, *to strangle*.) A nervous sort of quinsy or hysteric suffocation, in which the fauces are contracted or stopped up without inflammation. Globus hystericus, hysteric angina.

ANGORA, or ANGOURA, a city of Natolia, in Asiatic Turkey, anciently called Ancyra. It was made the metropolis of Galatia, in the reign of Nero. It is the see of a Greek archbishop, and remarkable for the antiquities which remain in it. This city is governed by a pasha and cadi. Some have computed that there are 100,000 inhabitants, 90,000 of which are Turks, and about 1000 of these are janizaries; the Christians, Greeks, and Armenians, are about 10,000 in number. The finest goats in the world are bred at this place, their hair is of a fine white, almost like silk, which the inhabitants work into camblets, &c. In the neighbourhood of this town, Pompey obtained a memorable victory over Mithridates, and Tamerlane defeated Bajazet, emperor of the Turks. Lat. 39. 30 N. Lon. 32. 5 E.

ANGOUR. *s.* (*angor*, Lat.) Pain (*Harvey*).

ANGRA, a sea-port town of Tercera, one of the Azores, of which it is the capital. Lat. 38. 39 N. Lon. 27. 7 W.

A'NGRILY. *ad.* (from *angry*.) In an angry manner, furiously, peevishly (*Shakspeare*).

ANGRIVARII, in ancient geography, a people of Germany, situated between the Weser and the Ems, and eastward reaching beyond the Weser, as far as the Cherusci, on which side they raised a rampart (*Tacitus*), to the south, having the Tubantes on the Ems, and on the Weser where it bends to the forest Bacenis, to the west, the Ems and the confines of the Bructeri; and to the north, the territory of the Angrivarii lay between the Chauci and Ansibarii.

A'NGRY. *a.* (from *anger*.) 1. Touched with anger, provoked (*Genesis*). 2. Having the appearance of anger (*Prov.*). 3. Painful, inflamed, smarting (*Wiseman*).

ANGUILLA, in ichthyology, a species of muræna, or eel. See MURÆNA.

ANGUILLARIS, in ichthyology, a species of silurus, that inhabits the Nile.

ANGUILLIFORM, in zoology, having the shape or appearance of an eel.

ANGUINEAL HYPERBOLA, a name given by Newton to four of his curves of the 2d order, viz. species 33, 34, 35, 36, expressed by the equation $xy^2+ey=-ax^3+bx^2+cx+d$, being hyperbolas of a serpentine figure cutting the asymptotes with contrary flexions.

ANGUINEI VERSUS, in poetry, those which may be read backwards. These are otherwise called recurrent verses. Such, e. g. are

> Optimum jus, lex amica, vox diserta
> Diserta vox, amica lex, jus optimum.

ANGUINUM OVUM, a fabulous kind of egg, said to be produced by the saliva of serpents, and possessed of certain magical virtues. This egg appears, in fact, to have been nothing more than a curious glass bead, by which the Druids imposed upon the vulgar.

The following account of this egg, in the part of a Druid, is extracted from Mason's Caractacus.

> ——————But tell me yet,
> From the grot of charms and spells,
> Where our matron sister dwells,
> Brennus, has thy holy hand
> Safely brought the Druid wand,
> And the potent adder-stone,
> Gender'd 'fore th' autumnal moon,
> When in undulating twine,
> The foaming snakes prolific join,
> When they hiss, and when they bear
> Their wond'rous egg aloof in air,
> Thence before to earth it fall,
> The Druid in his hallow'd pall
> Receives the prize,
> And instant flies,
> Follow'd by th' envenom'd brood,
> Till he cross the crystal flood?

ANGUIS Snake a genus of the class and order amphibia, serpentes thus generically distinguished scales on the belly, and scales under the tail Twenty-six species, chiefly of Asia and America The following are chiefly entitled to notice A Scytale Scales of the belly 240, of the tail 13 South America, and India; varies very much in its colours, generally orange with black blotches, sometimes black and white, sometimes pale rose and black, paler beneath and beautifully fasciated with bars of deep black A Eryx Aberdeen-snake scales of the belly 126, of the tail 136 America and England, above cinereous with three black lines the whole length, beneath lead colour with white spots A fragilis Blind worm Scales of the belly 135, of the tail 135 Europe and Siberia, in hollow ways, woods, paths, and among rubbish, breaks into pieces if thrown down, and the fragments will live a long time afterwards Back yellowish-ash, belly black, sides streaked with black and white, tail long, obtuse, scales small, soft, compact Colour various

A'NGUISH *s* (from *angoisse*, Fr) Excessive pain either of mind or body (*Donne*)

A'NGUISHED *a* (from *anguish*) Excessively pained not in use (*Donne*)

A'NGULAR *a* (from *angle*) 1 Having angles or corners (*Brown*) 2 Consisting of an angle (*Newton*)

ANGULAR MOTION, is the variation in the angle described by a line, or radius, connecting a body with the centre about which it moves Thus a pendulum has an angular motion about its point of suspension, and the planets have an angular motion about the sun The angular motions of revolving bodies are as their real or absolute motions directly, and as their radii of motion inversely they are also reciprocally proportional to the periodic times

ANGULAR STEM (*Angulatus caulis*) Excavated or grooved longitudinally with more than two hollow angles Called triangular, &c (trigonus, &c) according to the number of these angles —obtuse-angled or acute-angled, from the measure of them

Leaves also, and pericarps, running out into angles, are named triangular, &c from the number of angles

ANGULA'RITY *s* (from *angular*) The quality of being angular

A'NGULARLY *ad* (from *angular*) With angles or corners (*Boyle*)

A'NGULARNESS *s* (from *angular*) The quality of being angular

A'NGULATED *a* (from *angle*) Formed with angles or corners (*Woodward*)

ANGULO'SITY *s* (from *angulous*) Angularity, cornered form

A'NGULOUS *a* (from *angle*) Hooked, angular (*Glanville*)

ANGURIA In botany, a genus of the class and order monœcia diandria Calyx five-cleft corol five petalled, pome inferior, two-celled, many seeded Three species natives of the West Indies

ANGUS, a shire of Scotland, having the Mernes on the North, the German Ocean on the East, the Frith of Tay on the South, and Perth and Goury on the West It is diversified with lakes and hills, and is fruitful in corn and pasture It has 99,127 inhabitants

ANGU'ST *a* (*angustus*, Lat) Narrow strait

ANGUSTA'TION *s* (from *angustus*, Lat The act of making narrow, the state of being narrowed (*Wiseman*)

ANGUSTICLAVIA, in antiquity, a tunica, embroidered with little purple studs, worn by the knights

ANGUSTURA CORTEX, (*Angustura* A bark imported from Angustura, in South America Its external appearance varies considerably The best is not fibrous, but hard compact, and of a yellowish brown colour and externally of a whitish hue When reduced into powder it resembles that of Indian rhubarb It is very generally employed as febrifuge, tonic, and adstringent In intermittents it is by many preferred to the Peruvian bark, and has been found useful in diarrhœa, dyspepsia and scrofula It is thought to be the bark of the Brucea antidysenterica o ferruginea

ANHALT, a principality of Upper Saxony in Germany, having the county of Mansfeldt on the South, the duchy of Halberstadt on the West, Saxony on the East, and Magdeburg on the North Its principal trade is in beer

ANHALT, an island of North Jutland in Denmark, lying in the Cattegat Being dangerous for seamen, a light-house has been erected

ANHELA'TION *s* (*anhelo*, Lat) The act of panting, the state of being out of breath

ANHE'LOS (*an* Lat) Out of breath, panting

ANHOLT, in geography an island of Denmark, situated in the Cattegat, surrounded with sandbanks and dangerous to seamen, for which reason there is a light house on it N Lat 56 38 E Lon 11 5?

ANHIDROUS SULPHATE OF LIME See SULPHATE

ANI See CROTOPHAGI

ANICH (Peter), an ingenious mathematician, was the son of a labourer, at Oberperfuz, near Inspruck, where he was born 1723 His genius being discovered by Father Hill, a jesuit, in the university of Inspruck he became his tutor and patron In a little while Anich became an able astronomer, and ingenious mechanic He made an elegant pair of globes for the university of Inspruck and constructed various mathematical instruments He also drew maps and charts with great accuracy and neatness He died in 1766, and the empress queen, from a regard to his merit settled a pension of 50 florins a year on his sister

ANIDROSIS (from *a* priv and ἱδρως, *sweat* Privation of sweat or perspiration

ANJENGO, a small town on the coast Malabar, belonging to the English East-India Company Their merchandize consists chief

in pepper and callicoes. Lat 7 0 N Lon 76 1 E

ANI'GHTS *ad* (from *a* for *at*, and *night*) In the night-time (*Shakspeare*).

ANIGOZANTHOS In botany, a genus of the class and order hexandria monogynia Corol six-parted, with unequal incurved segments, stamens inserted in the throat of the corol, capsule three-celled, many-seeded The only known species is a native of New Holland

ANILENESS, ANILITY *s* The old age of women

ANIMA, among divines and naturalists, denotes the soul, or principle of life in animals See SOUL

ANIMA, among the old chemists, denoted the volatile or spirituous parts of bodies

ANIMA HEPATIS, is an obsolete name for the ferrum vitriolatum, or sulphate of iron, on account of its supposed efficacy in diseases of the liver

ANIMA MUNDI, a certain pure ethereal substance or spirit, diffused, according to many of the ancient philosophers, through the mass of the world, informing, actuating and uniting the divers parts thereof into one great, perfect, organical, and vital body or animal They add, that this anima mundi, which more immediately resides in the celestial regions as its proper seat, moves and governs the heavens in such manner, as that the heavens themselves first receive their existence from the fecundity of the same spirit, for that this anima, being the primary source of life, every-where breathed a spirit like itself by virtue whereof various kinds of things were framed conformably to the divine ideas

ANIMA SATURNI, a white powder obtained by pouring distilled vinegar on litharge, of considerable use in enamelling See ENAMEL

A'NIMABLE *a* (from *animate*) That may be put into life, or receive animation

ANIMADVERSION *s* (*animadversio*, Lat) 1 Reproof, severe censure (*Clarendon*) 2 Punishment (*Swift*)

ANIMADVERSIVE *a* (from *animadvert*) That has the power of judging (*Glan*)

To ANIMADVE'RT *v n* (*animadverto*, Lat) 1 To pass censures upon (*Dryden*) 2 To inflict punishments upon (*Grew*)

ANIMADVE'RTER *s* (from *animadvert*) He that passes censures, or inflicts punishments (*South*)

A'NIMAL, in natural history, an organized and living body, endowed with the powers of sensation and of voluntary loco-motion The word is derived from anima, soul, and literally denotes something that is endued with a soul

ANIMAL *a* (*animalis*, Lat) That belongs or relates to animals (*Watts*)

Animal acids, are those which have been discovered in animal substances, or which contribute to their formation These are, the acetic, the amniotic, the benzoic, the carbonic, the lactic, the malic, the muriatic the oxalic, the phosphoric, the rosacic, the sulphuric, and the uric many of them, however, are not peculiar to animals, but are frequently found both in vegetables and minerals See ACID

Animal actions Actiones animales Those actions, or functions, are so termed, which are performed through the means of the mind To this class belong the external and internal senses, the voluntary action of muscles, voice, speech, watching, and sleep

Animal economy, the structure and uses of the different parts of the body

Animal functions, are those by which the materials which constitute and support the bodies of animals are prepared and supplied The principal of these functions are the following—circulation, digestion, nutrition or assimilation, respiration, and secretion, which are employed in producing animal matter from the substances which compose it But, besides these, there are others, which, though they do not act chemically, like the foregoing, are in many animals subservient to various important purposes See IRRITABILITY, SENSIBILITY, &c

Animal heat Heat is essentially necessary to life That of a man in health is from about 94° to 100° of Fahrenheit It appears to depend upon the absorption of oxygen in the lungs.

Animal magnetism, a sympathy, by some persons lately supposed to exist between the magnet and the human body, by means of which the former became capable of curing many diseases in an unknown way, something resembling the performances of the old magicians

The fanciful system, to call it by no worse name of animal magnetism, appears to have originated, in 1774, from a German philosopher named father Hehl, who greatly recommended the use of the magnet in medicine M Mesmer, a physician of the same country, by adopting the principles of Hehl, became the direct founder of the system but, afterwards deviating from the tenets of his instructor, he lost his patronage, as well as that of Dr Ingenhousz, which he had formerly enjoyed Mesmer had already distinguished himself by "A dissertation on the influence of the stars upon the human body, which he publicly defended in a thesis before the university of Vienna, but he was so unable to stand before the opposition of Hehl and Ingenhousz, that his system fell almost instantly into disrepute Mesmer appealed to the academy of sciences at Berlin, but they rejected his principles as destitute of foundation, and unworthy of the smallest attention He then made a tour through Germany publishing every where the great cures he performed by means of his animal magnetism, while his enemies every where pursued him with detections of the falsehood of his assertions

Mesmer, still undaunted by so many defeats, returned to Vienna, but meeting there with no better success than before, he retired to Paris in the beginning of the year 1778 Here he met with a very different reception He

was first patronised by the author of the Dictionnaire des Merveilles de la Nature, in which work a great number of his cures were published, Mesmer himself receiving likewise an ample testimony of his candour and solid reasoning." Our physician soon collected some patients, and in the month of April 1778, retired with them to Creteil, from whence he in a short time returned with them perfectly cured. His success was now as great as his disappointment had been before. Patients increased so rapidly, that the doctor was soon obliged to take in pupils to assist him in his operations. These pupils succeeded equally well as Mesmer himself, and so well did they take care of their own emolument, that one of them, named M. Deslon, realized upwards of 100,000l sterling. In 1779 Mesmer published a memoir on the subject of animal magnetism, promising afterwards a complete work upon the same, which should make as great a revolution in philosophy as it had already done in medicine.

The principles of the art were explained by Deslon, in the following manner.

1. Animal magnetism is an universal fluid, constituting an absolute plenum in nature, and the medium of all mutual influence between the celestial bodies, and betwixt the earth and animal bodies.

2. It is the most subtile fluid in nature, capable of a flux and reflux, and of receiving, propagating, and continuing all kinds of motion.

3. The animal body is subjected to the influences of this fluid by means of the nerves, which are immediately affected by it.

4. The human body has poles and other properties analogous to the magnet.

5. The action and virtue of animal magnetism may be communicated from one body to another, whether animate or inanimate.

6. It operates at a great distance without the intervention of any body.

7. It is increased and reflected by mirrors, communicated, propagated, and increased by sound, and may be accumulated, concentrated, and transported.

8. Notwithstanding the universality of this fluid, all animal bodies are not equally affected by it, on the other hand, there are some, though but few in number, the presence of which destroys all the effects of animal magnetism.

9. By means of this fluid nervous disorders are cured immediately, and others mediately, and its virtues, in short, extend to the universal cure and preservation of mankind.

From this extraordinary theory, Mesmer fabricated a paper, in which he asserted that all diseases arise from one common source, that they may be removed by one mode of cure, and that this cure consists in the application of animal magnetism. The folly and credulity of the times soon gained partizans to this new and plausible theory: it became at length so popular, and fashionable in France, that the jealousy of the faculty was awakened, and an application was made to government. A committee, consisting of physicians and members of the Royal Academy of Sciences, of which the late illustrious Franklin was a principal member, was immediately appointed, to inquire into its merits, and to ascertain its effects. The consequence of this examination was such as might have been anticipated by every rational mind. The spell was quickly broken, and the whole disclosed to be an artful imposition on the weakness and credulity of mankind. It is now almost universally exploded, and treated with merited ridicule and contempt. The practice, however, and subsequent detection of this wild and visionary doctrine, have not been altogether useless, since to the philosopher, it has added one more to the numerous catalogue of the errors and illusions of the human understanding, and affords a memorable instance of the power of imagination. Those who wish to learn more of the history of this species of quackery, are referred to Despiau's Select Amusements, and to Willich's Lectures on Diet and Regimen.

Animal matter. Under this term are comprehended all the various kinds of substances of which animal bodies are composed, not so much, however, with regard to the radical principles of which they consist, as to those particular and exclusive forms in which they exist throughout all the tribes of the animal kingdom, as far as they have been subjected to examination.

The different parts into which the bodies of animals, taken generally, may naturally be divided, are the following.

Solid. 1. Bones and shells.—2. Horns and nails.—3. Muscles, or fleshy parts.—4. Skin.—5. Membranes.—6. Tendons.—7. Ligaments.—8. Glands.—9. Brain and nerves.—10. Hair and feathers.—11. Silk and similar bodies, and in a diseased state of body the different kinds of calculi, and the concretions in the lungs, &c.

Fluid. 1. Blood, from which the following are secreted by digestion and its future processes.—2. Milk.—3. Yolk of egg.—4. Saliva.—5. Gastric juice.—6. Bile.—7. Cerumen.—8. Tears.—9. Humours of the eye.—10. Mucus of the nose, &c.—11. Synovia.—12. Semen.—13. Liquor of the amnios.—14. Urine, and, in cases of disease, the morbid secretions of pus, liquor of the dropsy, and that from blisters.

In the composition of these parts, the following animal substances have been discovered. 1. Gelatine.—2. Albumen.—3. Fibrin, gluten, or animal fibre.—4. Mucilage.—5. Urea.—6. Sugar.—7. Oils.—8. Resins.—9. Acids.—10. Alkalies.—11. Earths.—12. Metals.

And these again are formed principally from different proportions and combinations of the following simple substances. 1. Azote.—2. Carbon.—3. Hydrogen.—4. Oxygen.—5. Phosphorus.—6. Lime.—7. Sulphur.—8. Soda.—9. Potass.—10. Muriatic acid.—11. Magnesia.—12. Silica.—13. Iron.—14. Manganese. The

first six are so much more abundant than the rest, that animal matters may in general be considered as in a great measure composed of them, the first four constitute almost entirely the soft parts, and the other two form the bases of the hard parts Magnesia and silica are only found in exceedingly small quantities, and the last only in cases of disease

Of all the simple and compound substances mentioned above, as existing in one form or other in the different classes of animals, particular accounts will be found in the several articles of this work to which their names refer

Analysis of animal matter Among the vast variety of objects which the curiosity of man has impelled him to investigate, and about which the researches of chemistry have been employed, the substances of which animals are composed have not, till late years, been regarded with a proportionate attention The French chemists, particularly Vauquelin, Berthollet, and Fourcroy, by deviating from the old method of analysis by fire, according to which all animal substances afforded the same results, and employing in its stead the simpler menstrua, have been enabled to discover many peculiar products of animalization The analysis of animal matter and even of that of vegetables, is still, however, far from being perfect, and is much less complete and satisfactory than of inorganized substances While, therefore, our knowledge of this subject has been greatly improved, many more discoveries, and much patient investigation, are necessary to render it subservient to many practical purposes, or to extend materially our acquaintance with the physiology of the human frame

Animal matters are at present analysed in a very different way from that in which they were analysed a few years since They are no longer subjected to decomposition by fire, they are now treated by re-agents particularly acids, (the most effectual of which is nitrous,) alkalies alcohol, &c The different fluids intermingled with each other, or contained in the vesicles of the different parts, are separated by rest, decantation, filtration, or expression The action of these substances on colouring matters is examined, and the several changes which they are liable to suffer in different temperatures are observed Animal liquors are carefully evaporated, and the different salts which they contain extracted from them unaltered By these methods of analysis modern chemists have made a number of important discoveries concerning animal substances Scheele has found them to contain several acids different from those which were before known Berthollet has demonstrated the existence of phosphoric acid, in a naked state, in urine and sweat, and has likewise found in animal matters, a remarkable quantity of the azotic principle This last discovery is one of the most important facts which the analysis of animal matters has made known to us The existence of azot in these substances, especially in their fibrous parts, accounts for the difference between animal and vegetable matters. This body is obtained in the state of elastic fluidity, i e azotic gas, by treating the flesh of the muscles with nitric acid even without the operation of any external heat, it is disengaged in a pretty large proportion—it passes before the nitrous gas, and when the latter begins to be disengaged, the operation should be stopped, and the vessels changed By this discovery Berthollet explains the formation of the ammonia which animal substances afford, when treated by fire—the production and disengagement of this salt by putrefaction—and the relation between these substances and vegetable matters that are liable to putrefaction, and afford ammonia by distillation It appears, in fact, that in both these instances the ammonia is formed by the combination of hydrogen with azot (*Fourcroy*)

It has been already mentioned that fire was formerly the only agent employed in the analysis of animal and vegetable substances, which were subjected to distillation in a retort, by a heat at first gentle, and afterwards increased gradually till every part of the animal matter was volatilized, and only a fixed residue, termed caput mortuum, remained in the retort By this method an important distinction was obtained between animal and vegetable matter: the latter yielded an acid liquor, and the former a urinous or volatile alkaline one, together with a concrete salt of the same nature, and an empyreumatic oil more fetid than the oils of vegetables, and of a different kind of fetor The putrefaction of animal substances gives similar products, particularly ammonia Another difference between these substances is remarked in the fixed residuum after distillation in close vessels in vegetable matter this is composed principally of charcoal, and in that of animals of a large proportion of phosphoric salts, generally united with lime

Beside the imperfection of the method of analysis by fire, it is attended with the following disadvantages—it affords an alkali (ammonia) formed by the process, and not previously contained in the substance examined—and it confounds in a few common products of distillation a variety of parts which have perfectly distinct and often opposite qualities In the improved methods which modern chemists have introduced, a number of re-agents are employed, of which the following are the principal

1 *Nitrous acid*, which has been more extensively useful in discovering the properties of animal matters, and their various modes of action, than any other substance Since the nature of this acid has been explained by the ingenious researches of Priestley, Cavendish, and others, it has proved of signal use to chemists, among whom, Bergman, Berthollet, and Fourcroy, have applied it with considerable ability and success

2 *Heat*, in various degrees and forms beside that of distillation: it is not only of advantage in separating the more fluid from the soft, and the solid matters, but occasionally contributes to increase and regulate the action of the other agents.

3 *Water*, which may often be employed with considerable advantage: its effects may be increased by the use of a Papin's digester

4 *The caustic alkalies*, which are particularly used as a solvent for gluten and coagulated albumen, after the action of water has been exhausted

To particularize the various processes to which these are applied, and the numerous phenomena which accompany and follow their use, would far exceed our limits we therefore refer the curious enquirer to such works as treat more fully on the subject, especially Thomson's Chemistry, vol IV Fourcroy's Elements of Chemistry, translated by Nicholson, vols III and IV, and his System of Chemical Knowledge Rees's Cyclopedia, art Animal matter, &c &c Encyclopedia Britannica

On comparing animal with vegetable substances, it has been found that, though the same radical principles frequently enter into the composition of both, they are distinguished by different proportions of these principles, animal matter containing much more azote and phosphorus, and vegetable more carbon, hydrogen, and oxygen

To conclude in the words of Fourcroy Although many experiments still remain to be performed, and many discoveries to be made, in order to complete the history of animal matters, yet our present knowledge of them is much more considerable than what was formerly possessed the proper road is, at least, discovered, and we need no longer be afraid of wandering in a wrong direction It now appears plainly how much the physics of animal nature may be improved by chemistry, and what important services medicine may expect from it, when the two sciences proceed hand in hand

Animal oil See OIL, and OLEUM

Animal putrefaction, is that change which animal bodies undergo when deprived of life, and by which they are gradually and completely decomposed The process by which this change is occasioned, is effected chiefly by the access of air, aided by a due degree of moisture, and of heat The principal circumstances attending this decomposition of animal matter are the following

Its colour first becomes pale, its consistence diminishes, its texture is relaxed, and a faint and disagreeable smell is emitted The colour at this time changes to blue and green, the parts become more and more softened, the smell becomes fetid, and the colour of an obscure brown The fibres now yield, the texture is more resolved, the putrid and nauseous smell is mixed with a smell of a more penetrating kind, arising from the disengagement of ammoniacal gas; after this the mass becomes of still less and less consistence, the smell more faint and nauseous, and the effluvia exceedingly active and injurious, arising, it has been said, from the separation of phosporated and carbonated hydrogen gas, a separation of phosphorus light taking place at the same time After it has continued in this state some time, the mass again swells up, and carbonic acid gas is separated, this part of the process is protracted for some time, when it changes into a soft putrid mass

A great part of the hydrogen, and the remaining carbon, with the other fixed radicals, now gradually form a dark brown, soft, earthy matter This result forms soil, which, mixed with mould, the remains of vegetable putrefaction, forms the common receptacle for the roots, and germinating seeds of vegetables

When this resolution takes place at the same time with vegetable matter, as in marshes, some portion of the hydrogen and phosphorus produce the ignes fatui, and such luminous appearances If this resolution is accomplished in a confined place, a foul musty smell is discoverable

Heat, moisture, and the access of air should be avoided if it be intended to prevent this process from taking place In one or other of these modes the various antiseptic processes act, such as covering with resins and balsams, drying, salting and smoking, immersion in spirits, freezing water, &c (*Parkinson*) See PUTREFACTION

A curious instance of partial decomposition has been observed to take place in whole bodies, after burial, by which their muscular parts have been converted into a white fatty matter, resembling spermaceti This was first remarked by the French chemists, a few years ago, in taking up some bodies which had been interred in the Cemeterie des Innocens, at Paris Similar effects have been produced on the body of a duck or young goose, by lying some time in mud, and on the lean of beef placed in a river, and enclosed in a box with holes See ADIPOCIRE

Animal system, imports the whole class of beings endowed with animal life in which sense it amounts to much the same as what we call the animal kingdom

ANIMALCULE, ANIMALCULUM, a diminutive of animal, and applied in a general manner to those creatures whose true figure cannot be discerned without the help of glasses, and more especially to such as are invisible to the naked eye

By the help of magnifying glasses, we are brought into a kind of new world, and numberless animals are discovered, which from their minuteness must otherwise for ever have escaped our observation and how many kinds of these invisibles there may be, is still unknown, as they are discerned of all sizes, from those which are barely invisible to the naked eye, to such as resist the action of the microscope, as the fixed stars do that of the telescope, and with the best magnifiers hitherto invented, appear only as so many moving points The smallest living creatures our instruments can show are those that inhabit the waters for though possibly animalcules equally minute, or perhaps more so, may fly in the air, or creep upon the earth, it is scarce possible to bring such under our examination, but water being transparent, and confining the creatures in it,

we are able, by applying a drop of it to our microscopes, to discover, at least, to a certain extent, all that it contains

Animalcules are seen only by the assistance of microscopes, and are perhaps more numerous than any other part of the animal creation, but the species, on a close examination, are found to be but few, in proportion to the number of individuals The most obvious distinction among them is, that some have, and others have not tails, and that some have, and others have not visible limbs According, therefore, to these characters, they are arranged under three classes, distinguished by the names of gymnia, cercaria, arthronia, the first containing those which have no visible limbs, nor any tail, the second, those which have tails, the third, those which have visible limbs

Animalcules are said to be the cause of various disorders The itch, from several experiments, is affirmed to be a disorder arising from the irritations of a species of animalcula found in the pustules of that disease, whence the communication of it by contact from one to another is easily conceived, as also the reason of the cure being effected by cutaneous applications On this foundation, some have attributed the small-pox, measles, and other infectious diseases, and others the epilepsy, &c to animalcules Languis goes farther, and pretends to reduce all diseases in general to the same principle A late writer at Paris, who assumed the title of an English physician, has done more He not only accounts for all diseases, but for the operations of all medicines upon the hypothesis of animalcules He had peculiar animals for every disease, scorbutic animalcules, podagric animalcules, variolous animalcules, &c all at his service Journ des Sçav tom LXXXII p 535, &c But as most discoveries in natural philosophy have laid a foundation for the warm imaginations of some men to form visionary theories, to the great prejudice of real knowledge, so those relating to animalcules have been drawn in, however improperly, to support the most whimsical and chimerical systems

For more on this subject the inquisitive reader may consult the papers of Lewenhoek, Baker, &c in the Philosophical Transactions, Baker on the Microscope, Kanmacher on the Microscope, &c

ANIMA'LITY *s* (from *animal*) The state of animal existence (*Watts*)

ANIMALIZA'TION The process employed by the animal machine to convert vegetable substances introduced into the stomach for the sake of nutrition, into animal matter It is the commencement of what is denominated by physiologists assimilation, or the translation of alimentary substances, whether produced from the vegetable or animal kingdom, into such a state as renders them similar to the different organs of which they are to become a constituent part

The chief difference between vegetable and animal matters is, that the former possesses a great abundance of carbon, compared with its azot, and the latter a great abundance of azot, compared with its proportion of carbon These two processes, therefore, which are of a chemical nature, consist in exhausting the vegetable nutriment or saccharine matter of its surplus of carbon, and communicating an accession of azot, both which take place by the functions of respiration and perspiration

To A'NIMATE *v a* (*animo*, Lat) 1 To quicken, to make alive 2 To give powers to (*Dryden*) 3 To encourage; to incite (*Knolles*)

A'NIMATE *a* (from *To animate*) Alive, possessing animal life (*Bentley*)

A'NIMATED *particip a* (from *animate*) Lively, vigorous (*Pope*)

A'NIMATION *s* (from *animate*) 1 The act of animating or enlivening (*Bac*) 2 The state of being enlivened (*Brown*)

A'NIMATIVE *a* (from *animate*) That has the power of giving life

ANIMA'TOR *s* (from *animate*) That which gives life (*Brown*)

ANIME, or ANIMÆ, GUMMI The substance which bears this name in the shops is a resin, the produce of the hymenæa courbaril of Linneus It is seldom ordered in the medical practice of the present day, and is only to be met with in the collections of the curious

ANIME, in heraldry, a term used when the eyes of a rapacious creature are borne of a different tincture from the creature itself

ANIMI DELIQUIUM, (from *animus*, the mind, and *delinquo*, to leave) Fainting Lipothymia See SYNCOPE

ANIMO'SE *a* (*animosus*, Lat) Full of spirit, hot, vehement

ANIMO'SITY *s* (*animositas*, Lat) Vehemence of hatred, passionate malignity (*Sw*)

ANIMUS This word is to be distinguished from anima, the former expresses the faculty of reasoning, and the latter the being in which that faculty resides

ANINGA, in commerce, a root which grows in the Antilles, and is used by sugar-bakers in the refining of sugar

ANJOU, a late province of France It now forms, with the late provinces of Maine and Touraine, the four departments of Maine and Loire, Indre and Loire, Maine, and Sarte

ANISE See PIMPINELLA

ANISE SEED See ILLICIUM

ANISUM, (*anisum*, ανισον, from α, neg and ισος, *equal*) Anisum vulgare Anise Pimpinella anisum of Linnéus Pimpinella, foliis radicalibus trifidis incisis Class, pentandria order, digynia A native of Egypt Aniseseeds have an aromatic smell, and a pleasant, warm, and sweetish taste An essential oil and distilled water are prepared from them, which are employed in flatulencies and gripes, to which children are more especially subject, also in weakness of the stomach, diarrhœas, and loss of tone in the primæ viæ

ANISUM SINENSE See ANISUM STELLATUM

ANISUM STELLATUM Anisum Sinense

Semen badian. The plant which affords these seeds is the illicium anisatum of Linnæus They are used with the same views as those of the pimpinella anisum The same tree is supposed to furnish the aromatic bark called cortex anisi stellati or cortex lavola

ANISUM VULGARE See ANISUM

A'NKER s (*ancker*, Dutch) A liquid measure, the fourth part of an awm, and contains two stekans, each stekan consists of sixteen mengles, the mengle being equal to two of our wine quarts

ANKLE, joint of the, in anatomy, is made by the apposition of the astragalus, or upper bone of the foot, to the lower part of the tibia and fibula, which are, for that purpose, tied together by a strong band of ligaments both before and behind

ANKLE, luxation of See DISLOCATION and LUXATION

ANNA, the principal town of a province of the same name in Asiatic Turkey, seated on the western bank of the river Euphrates Lat 33 35 N Lon 41 0 E

ANNABERG, a town of Germany, in the archduchy of Austria four miles E Efferding

ANNABERG, a town of Germany, in the circle of Ertzeburg, and electorate of Saxony five miles SSW Wolkenstein

ANNABURG, a town of Germany, in the electorate of Saxony, sixteen miles ESE Wittenburg Lon 30 40 E Ferro Lat 51 41 N

ANNAGH, an island on the west coast of Ireland, about five miles in circumference, between the isle of Achil, and the main land of the county of Mayo Lon 9 39 W Greenwich Lat 53 58 N

ANNAGH, a small island of Ireland, in Lough Conn, in the county of Mayo eight miles from Killala

ANNALIS CLAVUS, the nail which the prætor, consul, or dictator, drove into the wall of Jupiter's temple annually upon the ides of September, to show the number of years a similar ceremony was sometimes performed to avert the plague

A'NNALIST s A writer of annals

ANNALS, a species of history, wherein events are related in the chronological order they happened

It differs from a perfect history, in being only a mere relation of what passes every year, as a journal is of what passes every day, whereas history relates not only the transactions themselves, but also the causes, motives, and springs of such actions Cicero informs us that the pontifex maximus, in order to preserve the memory of events, wrote what passed each year on tablets, which were exposed to public inspection in his own house These tablets were called annales maximi; hence the writers who imitated this method of writing were stiled annalists

Of this opinion the great annalist, Tacitus himself, seems to have been, because the first part of his work, which treats of former times, he calls annals, but when he comes down to his own times, he changes his title, and calls it history

The Annals of Grotius is a book finely written, and contains excellent materials He is not so particular as Strada, but more profound, and comes much nearer to Tacitus

ANNAMOOKA, one of the Friendly isles, discovered by Tasman, in 1643, and visited by captain Cook, in the years 1774 and 1777 Lat 20 0 S Lon 176 W

ANNAN, a borough of Annandale (a district of Dumfriesshire) in Scotland It is seated on the river Annan, three miles north of Solway Frith Lat 55 0 N Lon 3 4 W

ANNAPOLIS, a town of Maryland, North America Lat 39 0 N Lon 77 20 W

ANNAPOLIS, the capital town of Nova Scotia, North America Lat 44 52 N Lon 64 5 W

ANNATES, among ecclesiastical writers, a year's income of a spiritual living These were, in ancient times, given to the pope through all Christendom upon the decease of any bishop, abbot, or parish-clerk, and were paid by his successor At the Reformation they were taken from the pope, and vested in the king, and, finally, queen Anne restored them to the church, by appropriating them to the augmentation of poor livings

ANNE, queen of Great Britain, was the second daughter of James II by lady Anne Hyde, and was born in 1664 In 1683, she married prince George of Denmark, by whom she had several children, but all of them died young In 1702, she succeeded to the crown on the death of William III Her reign was distinguished by great glory, and on account of the eminent literary characters which adorned it, has been called the Augustan age of Britain But the spirit of party never, perhaps, rose higher than it did in her time She died in 1714

The character of this princess has been thus given by Smollett "Her capacity was naturally good, but not much cultivated by learning, nor did she exhibit any marks of extraordinary genius, or personal ambition she was certainly deficient in that vigour of mind by which a prince ought to preserve her independence, and avoid the snares and fetters of sycophants and favourites, but whatever her weakness in this particular might have been, the virtues of her heart were never called in question she was a pattern of conjugal affection and fidelity, a tender mother, a warm friend, an indulgent mistress, a munificent patron, a mild and merciful princess, during whose reign no blood was shed for treason She was zealously attached to the church of England, from conviction rather than from prepossession, unaffectedly pious, just, charitable, and compassionate She felt a mother's fondness for her people, by whom she was universally beloved with an affection which even the prejudice of party could not abate In a word, if she was not the greatest, she was certainly one of the best and most unblemished sovereigns that ever sat upon the throne of

England, and well deserved the expressive, though simple epithet of, the "good queen Anne"

ANNE BOLEYN See BOLEYN

To ANNE'AL *v n* (*ælan*, Saxon) 1 To heat glass, that the colours laid on it may be fixed (*Dryden*) 2. To heat any thing in such a manner as to give it the true temper

ANNEALING, consists in making metals red-hot which have become hard and stiff by frequent percussion, or by a strong compression, in order to restore their former malleability and tractability All metals have the singular property of becoming more or less hard, untractable, and unmalleable, after they have been struck some time with a hammer It seems as if something happened to them similar to the effect produced by the tempering of steel Metals thus affected become more elastic than before, but, at the same time, more brittle They are more sensibly affected in this manner in proportion as they are naturally harder Copper is so much affected, and even gold and silver, by hammering, that they soon cease to be malleable, and are apt to split and crack, instead of being extended, under the hammer This labour, therefore, must be often interrupted, to soften and restore malleability to metals this is effected by making them red-hot, which the workmen call annealing Thus, heat produces the same effect on metals in the state described, as it does upon tempered steel for, if the hardest tempered steel be made red-hot and cooled slowly, it becomes as tractable and ductile as the softest iron (*Macquer*)

Forged iron has long been procured, by placing a mass of cast iron under large hammers, and making it undergo violent and repeated compression A process is now used for converting cast-iron into forged, by heat alone The cast-iron is placed in an air-furnace, and kept for several hours in a degree of heat, by which it is brought near to a fluid state It is then allowed to cool gradually, and is found to be converted into a substance similar to forged iron This process is conducted under a patent, although, if Reaumur s experiments upon cast-iron be consulted, it will appear not to be a new discovery English Encyclopedia

There is also an annealing for articles made of glass It consists in placing them, while newly made, and still hot, in an oven or furnace, where they very slowly cool This annealing for bottles and other glass utensils is quite necessary to render them serviceable, for all glass which is cooled suddenly is liable to be broken, not only by the least change of heat and cold, but even by the slightest force (*Macquer*) See NEALING

To ANNE'X *v a* (*annecto*, *annexum*, Lat) 1 To unite to at the end 2 To unite, as a smaller thing to a greater 3 To unite *à posteriori* (*Raleigh*)

ANN'EX *s* (from *To annex*) The thing annexed, additament (*Brown*)

ANNEXA'TION *s* (from *annex*) 1 Conjunction, addition (*Hammond*) 2 Union, act of uniting (*Ayliffe*)

ANNE'XION *s*. (from *annex*) The act of annexing, addition (*Rogers*)

ANNE'XMENT *s* (from *annex*) 1. The act of annexing 2. The thing annexed (*Shakspeare*)

ANNIBAL See HANNIBAL

ANNI'HILABLE *a*. (from *annihilate*) That may be put out of existence.

To ANNI'HILATE *v a* (*ad* and *nihilum*, Lat) 1 To reduce to nothing (*Bacon*) 2 To destroy (*Raleigh*) 3 To annul (*Hooker*)

ANNIHILA'TION *s* (from *annihilate*) The act of reducing to nothing, the state of being reduced to nothing (*Dryden*)

ANNIVERSARY, is properly the yearly return of any remarkable day anciently also called a year-day, or mind-day, that is, a memorial-day The word is formed from annus and verto, on account of its returning every year.

ANNO DOMINI, q d in the year of our Lord, the computation of time from the epocha of the incarnation of Jesus Christ This is generally inserted in the dates of all public writings, with an addition of the year of the king s reign

ANNO'NA. Custard-apple a genus of the class and order polyandria polygynia Calyx three-leaved, petals six, berry many-seeded, rounded, with a scaly bark Twenty-five species, all natives of the East or West Indies or America; a fleshy fruit is produced by most of them, and is palatable The pulp of the a miloba of Caroline is highly sweet and luscious

ANNONA, in Roman antiquity, provision of all sorts for a year

ANNONAY, a town of France in the department of Ardeche Lat 45 18 N Lon 4 45 E

ANNOTA'TIO, ANNOTATION (from *annoto*, to mark) The attack or first mark of a febrile paroxysm

ANNOTA'TION *s* (*annotatio*, Latin) Explication, note (*Boyle*)

ANNOTA'TOR *s* (Latin) A writer of notes, a scholiast, a commentator (*Felton*)

ANNOTTO, ANOTTO, or ARNOTTA, in commerce, a kind of red dye, brought from the West Indies It is procured from the pulp of the seed-capsules of a tree called bixa in South America See BIXA

The annotto is prepared only by the Spaniards, the mode is as follows the contents of the fruit or capsule are thrown into a wooden bowl, where as much hot water is poured on them as is necessary to suspend the red matter or pulp When the seeds are left quite naked, they are taken out, and the wash is left to settle The water is then poured off, and the sediment dried by degrees in the shade, after which it is made into balls or cakes for exportation See ARNOTTA.

To ANNO'UNCE *v a* (*annoncer*, Fr) 1 To publish, to proclaim (*Milton*) 2 To declare by a judicial sentence (*Prior*)

To ANNO'Y *v a* (*annoyer*, Fr) To incommode, to vex, to tease, to molest (*Sidney*)

ANNO'Y, *s.* (from the verb) Injury, molestation, trouble (*Dryden*).

ANNO'YANCE *s* (from *annoy*) 1 That which annoys (*Shakspeare*) 2 The act of annoying (*South*)

ANNO'YER *s* (from *To annoy*) The person that annoys

A'NNUAL *a* (*annuel*, Fr) 1 That comes yearly (*Pope*) 2 That is reckoned by the year (*Shakspeare*) 3 That lasts only a year (*Ray*)

ANNUAL EQUATION, in astronomy See EQUATION

ANNUAL PLANT OF ROOT, perishing within the compass of a year opposed to biennial or perennial The stem of herbaceous plants, although the root be permanent, is annual, and thus is distinguished from that of trees and shrubs

A'NNUALLY *ad* (from *annual*) Yearly, every year (*Brown*)

ANNUEL in the Scottish law, denotes any yearly revenue, or due, paid at certain terms, either legal, as Martinmas and Whitsuntide, or conventional, as the parties agree

ANNUEL OF NORWAY, of which mention is made in the acts of parliament of king James the Third, was an annual payment of an hundred marks sterling, which the kings of Scotland were obliged to pay to the kings of Norway, in satisfaction for some pretensions which the latter had to the Scottish kingdom, by virtue of a conveyance made thereof by Malcolm Kanmoir, who usurped the crown after his brother's decease

ANNU'ITANT *s* He that possesses or receives an annuity

ANNUITIES, a term for any periodical income, arising from money lent, or from houses, lands, salaries, pensions, &c payable from time to time, either annually, or at other intervals of time

Annuities may be divided into such as are certain, and such as depend on some contingency, as the continuance of a life, &c

Annuities are also divided into annuities in possession, and annuities in reversion, the former meaning such as have commenced, and the latter such as will not commence till some particular event has happened, or till some given period of time has elapsed

Annuities may be farther considered as payable either yearly, or half-yearly, or quarterly, &c

The present value of an annuity, is that sum, which, being improved at interest, will be sufficient to pay the annuity

When an annuity is forborn for some years, or the payments not made for that time, the annuity is said to be in arrears, in which case each payment is to be considered as a sum put out to interest for the remainder of the term after the time it becomes due

The amounts of annuities, or their present values, are easily found by the two following tables, properly computed from the principles of annuities

TABLE I.

The Amount of an Annuity of 1l at Compound Interest

Yrs	at 3 per cent	3½ per cent	4 per cent	4½ per cent	5 per cent	6 per cent
1	1 00000	1 00000	1 00000	1·00000	1 00000	1 00000
2	2 03000	2 03500	2 04000	2 04500	2 05000	2 06000
3	3 09090	3 10623	3 12160	3 13703	3 15250	3 18360
4	4 18363	4 21494	4 24646	4 27819	4 31013	4 37462
5	5 30914	5 36247	5 41632	5 47071	5 52563	5 63709
6	6 46841	6 55015	6 73298	6 [illegible]689	6 80191	6 97532
7	7 66246	7 77941	7 89829	8 01915	8 14201	8 39384
8	8 89234	9 05169	9 21423	9 38001	9 54911	9 89747
9	10 15911	10 36850	10 58280	10 80211	11 02656	11 49132
10	11 46388	11 73139	12 00611	12 28821	12 57789	13 18079
11	12 80780	13 14199	13 48635	13 84118	14 20679	14 97164
12	14 19203	14 60196	15 02581	15 46403	15 91713	16 86994
13	15 61779	16 11303	16 62684	17 15991	17 71298	18 88214
14	17 08632	17 67699	18 29191	18 93211	19 59863	21 01507
15	18 59891	19 29568	20 02359	20 78405	21 57856	23 27597
16	20 15688	20 97103	21 82453	22 71934	23 65749	25 67253
17	21 76159	22 70502	23 69751	24 74171	25 84037	28 21288
18	23 41444	24 49969	25 64541	26 85508	28 13238	30 90565
19	25 11687	26 35718	27 67123	29 06356	30 53900	33 75999
20	26 87037	28 27968	29·77808	31 37142	33 06595	36 78559
21	28 67649	30·26947	31 96920	33 78314	35 71725	39 99273
22	30 53678	32 32890	34 24797	36 30338	38 50521	43 39229
23	32 45288	34·46041	36 61789	38 93703	41 43048	46 99583
24	34 42647	36 66653	39 08260	41 68920	44 50200	50 81558
25	36 45926	38 94986	41 64591	44 56521	47 72710	54 86451
26	38·55304	41 31310	44 31174	47 57064	51 11345	59 15638
27	40 70963	43 75906	47 08421	50 71132	54 66913	63 70577
28	42 93092	46 29063	49·96758	53 99333	58 40258	68 52811
29	45 21885	48 91080	52·96629	57 42303	62·32271	73 63980
30	47 57542	51 62268	56·08494	61 00707	66 43885	79 05819

ANNUITY

Continuation of Table I.

Yrs	at 3 per cent	3½ per cent	4 per cent	4½ per cent	5 per cent	6 per cent
31	50 00268	54 42947	59 32834	64 75239	70 76079	84 80168
32	52 50276	57 33450	62 70147	68 66625	75 29883	90 88978
33	55 07784	60 34121	66 20953	72 75623	80 06377	97 34316
34	57 73018	63 45315	69 85791	77 03026	85 06696	104 18375
35	60 46208	66 67401	73 65222	81 49662	90 32031	111 43478
36	63 27594	70 00760	77 59831	86 16397	95 83632	119 12087
37	66 17422	73 45787	81 70225	91 04134	101 62814	127 26812
38	69 15945	77 02889	85 97034	96 13820	107 70955	135 90421
39	72 23423	80 72491	90 40915	101 46442	114 09502	145 05846
40	75 40126	84 55028	95 02552	107 03032	120 79977	154 76197
41	78 66330	88 50954	99 82654	112 84669	127 83976	165 04768
42	82 02320	92 60737	104 81960	118 92479	135 23175	175 95054
43	85 48389	96 84863	110 01238	125 27640	142 99334	187 50758
44	89 04841	101 23833	115 41288	131 91384	151 14301	199 75803
45	92 71986	105 78167	121 02939	138 84997	159 70016	212 74351
46	96 50146	110 48403	126 87057	146 09821	168 68516	226 50812
47	100 39650	115 35097	132 94589	153 67263	178 11942	241 09861
48	104 40840	120 38826	139 26321	161 58790	188 02539	256 56453
49	108 54065	125 60185	145 83373	169 85936	198 42666	272 95840
50	112 79687	130 99791	152 66708	178 50303	209 34800	290 33590
51	117 18077	136 58284	159 77377	187 53566	220 81540	308 75606
52	121 69620	142 36324	167 16472	196 97477	232 85617	328 28142
53	126 34708	148 34595	174 81131	206 83863	245 49897	348 97831
54	131 13750	154 53806	182 84536	217 14637	258 77392	370 91701

TABLE II

The present Value of an Annuity of 1l

Yrs	at 3 per cent	3½ per cent	4 per cent	4½ per cent	5 per cent	6 per cent
1	0 97087	0 96618	0 96154	0 95694	0 95238	0 94340
2	1 91347	1 89969	1 88610	1 87267	1 85941	1 83339
3	2 82861	2 80164	2 77509	2 74896	2 72325	2 67301
4	3 71710	3 67308	3 62990	3 58753	3 54595	3 46511
5	4 57971	4 51505	4 45182	4 38998	4 32948	4 21236
6	5 41719	5 32855	5 24214	5 15787	5 07569	4 91732
7	6 23028	6 11454	6 00205	5 89270	5 78637	5 58238
8	7 01969	6 87396	6 73274	6 59589	6 46321	6 20979
9	7 78611	7 60769	7 43533	7 26879	7 10782	6 80169
10	8 53020	8 31661	8 11090	7 91272	7 72173	7 36009
11	9 25262	9 00155	8 76048	8 52892	8 30541	7 88687
12	9 95400	9 66333	9 38507	9 11858	8 86325	8 38384
13	10 63496	10 30274	9 98565	9 68285	9 39357	8 85268
14	11 29607	10 92052	10 56312	10 22283	9 89864	9 29498
15	11 93794	11 51741	11 11839	10 73955	10 37966	9 71225
16	12 56110	12 09412	11 65230	11 23402	10 83777	10 10590
17	13 16612	12 65132	12 16567	11 70719	11 27407	10 47726
18	13 75351	13 18968	12 65930	12 15999	11 68959	10 82760
19	14 32380	13 70984	13 13394	12 59329	12 08532	11 15812
20	14 87747	14 21240	13 59033	13 00794	12 46221	11 46992
21	15 41502	14 69797	14 02916	13 40472	12 82115	11 76408
22	15 93692	15 16712	14 45112	13 78442	13 16300	12 04158
23	16 44361	15 62041	14 85684	14 14777	13 48857	12 30338
24	16 93554	16 05837	15 24696	14 49548	13 79864	12 55036
25	17 41315	16 48151	15 62208	14 82821	14 09394	12 78536
26	17 87684	16 89035	15 98277	15 14661	14 37519	13 00317
27	18 32703	17 28536	16 32959	15 45130	14 64303	13 21053
28	18 76411	17 66702	16 66306	15 74287	14 89813	13 40616
29	19 18845	18 03577	16 98371	16 02189	15 14107	13 59072
30	19 60044	18 39205	17 29203	16 28889	15 37245	13 76483
31	20 00043	18 73628	17 58849	16 54439	15 59281	13 92909
32	20 38877	19 06887	17 87355	16 78889	15 80268	14 08404
33	20 76579	19 39021	18 14765	17 02286	16 00255	14 23023
34	21 13184	19 70068	18 41120	17 24676	16 19290	14 36814
35	21 48722	20 00066	18 66461	17 46101	16 37419	14 49825

Continuation of Table II

Yrs.	at 3 per cent	3½ per cent	4 per cent	4½ per cent.	5 per cent	6 per cent
	21 83225	20 29049	18 90828	17 66604	16 54685	14 62099
	22 16724	20·57053	19 14258	17 86224	16 71129	14 73678
	22 49246	20 84109	19 36786	18 04999	16 86789	14 84602
	22 80822	21 10250	19 58448	18 22966	17 01704	14 94907
	23 11477	21 35507	19 79277	18 40158	17 15909	15 04630
	23 41240	21 59910	19 99305	18 56611	17 29437	15 13802
	23 70136	21 83488	20 18563	18 72355	17 42321	15 22454
	23 98190	22 06269	20 37079	18 87421	17 54591	15 30617
	24 25427	22 28279	20 54884	19 01838	17 66277	15 38318
	24 51871	22 49545	20 72004	19 15635	17 77407	15 45583
	24 77545	22 70092	20 88465	19 28837	17 88007	15 52437
	25 02471	22 89944	21 04294	19 41471	17 98102	15 58903
	25 26671	23 09124	21 19513	19 53561	18 07716	15 65003
	25 50166	23 27656	21 34147	19 65130	18 16872	15 70757
	25 72976	23 45562	21 48218	19 76201	18 25593	15 76186
	25 95123	23 62862	21 61749	19 86795	18 33898	15 81308
	26 16624	23 79576	21 74758	19 96933	18 41807	15 86139
	26 37499	23 95726	21 87267	20 06634	18 49340	15 90697
	26 57766	24 11330	21 99296	20·15918	18 56515	15 94998

The Use of Table I

To find the amount of an Annuity forborn any number of years Take out the amount from the first table, for the proposed years and rate of interest, then multiply it by the annuity in question, and the product will be its amount for the same number of years and rate of interest

And the converse to find the rate or time

Exam 1 To find how much an annuity of 50*l* will amount to in 20 years at 3½ per cent compound interest —On the line of 20 years, and in the column of 3½ per cent stands 28 27968, which is the amount of an annuity of 1*l* for the 20 years, and therefore 28 27968 multiplied by 50, gives 1413 984*l* or 1413*l* 19*s*. 8*d* for the answer,

Exam 2, In what time will an annuity of 20*l* amount to 1000*l* at 4 per cent compound interest?—Here the amount of 1000*l* divided by 20*l* the annuity, gives 50, the amount of 1*l* annuity for the same time and rate Then, the nearest tabular number in the column of 4 per cent, is 49 96758, which standing on the line of 28, shews that 28 years is the answer

Exam 3, If it be required to find at what rate of interest an annuity of 20*l* will amount to 1000*l* forborn for 28 years Here 1000 divided by 20 gives 50 as before Then looking along the line of 28 years for the nearest to this number 50, I find 49 96758 in the column of 4 per cent which is therefore the rate of interest required

The Use of Table II

Exam 1, To find the present value of an annuity of 50*l* which is to continue 20 years, at 3½ per cent —By the table, the present value of 1*l* for the same rate and time, is 14 21240, therefore 14·2124 × 50 = 710 62*l* or 710*l* 12*s* 4*d* is the present value sought

Exam 2 To find the present value of an annuity of 20*l* to commence 10 years hence, and then to continue 40 years, or to terminate 50 years hence, at 4 per cent interest —In such cases as this, it is plain we have to find the difference between the present values of two equal annuities, for the two given times, which therefore will be effected by subtracting the tabular value of the one term from that of the other, and multiplying by the annuity Thus,

Tabular value	for 50 years	21 48218
Ditto	for 10 years	8 11090
	the difference	13 37128
	multiplied by	20
	gives	267 4256

or 267*l* 8*s* 6*d* the answer

Those who are desirous of obtaining complete information on the subject of annuities, are referred to Malcolm's and Keith's Arithmetics, Simpson's Algebra, and his book on Annuities and Reversions, Dodson's Mathematical Repository, vo and Price's excellent Treatise on Annuities and Reversionary Payments

For what relates to the doctrine of annuities on lives, see Assurance, Complement Expectation, Life Annuities, Reversions, &c

To ANNU'L *v a* (from *nullus*, Lat) 1 To make void, to nullify 2 To reduce to nothing to obliterate

A'NNULAR *a* (from *annulus*, Lat) Having the form of a ring

Annular bone Circulus osseus A ring like bone placed before the cavity of the tympanum in the fœtus

Annular cartilages See Cricoid cartilages

ANNULA'RIS DIGITUS The ring finger The one between the little and middle finger

Annula'ris processus See Pons varolii

A'NNULARY *a* Having the form of rings

ANNULET, in architecture, a small square member in the Doric capital, under the quarter round It is also a narrow flat moulding, which is common to divers parts of the columns, as the bases, capitals, &c It is the same member which Vitruvius calls a fillet

ANNULET, in heraldry, a mark of distinction which the fifth brother of a family ought to bear in his coat of arms

ANNULLING, a term sometimes used for cancelling or making void a deed, sentence, or the like

ANNULUS, a ring, in geometry, the area of which is equal to the difference of the areas of the outer and inner circles or it may be found by multiplying the sum of their diameters by the difference, and the product by 7854

To ANNU'MERATE *v a* (*annumero*, Lat) To add to a former number

ANNUMERA'TION *s* (*annumeratio*, Lat) Addition to a former number

To ANNU'NCIATE *v a* (*annuncio*, Latin) To bring tidings

ANNUNCIATE, ANNUNTIADA, or ANNUNTIATA, a denomination common to several orders, both religious and military, instituted with a view to the Annunciation The first religious order of this kind was instituted in 1232, at Florence

ANNUNCIATA, or knights of the Annuntiada, was a military order, instituted in 1362, by Amadeus VI duke of Savoy, in memory of Amadeus I who defended the isle of Rhodes against the Turks

ANNUNCIA'TION-DAY *s* (from *annunciate*) The day celebrated by the church, in memory of the angel's salutation of the Blessed Virgin, solemnized with us on the twenty-fifth of March (*Taylor*)

The Jews give the title Annunciation to part of the ceremony of their passover, viz that wherein they explain the origin and occasion of that solemnity —This explanation they call הגדה, Haggada, q d the Annunciation

ANOBI'UM, a tribe of Fabricius See PTINUS

ANOCATHA'RTICS (ανακαθαρτικα, from ανω, *upwards*, and καθαιρω, *to purge*) Emetics medicines which purge upwards

ANODA, in botany, See SIDA

ANO'DMUS, ANO'DMOUS (from α priv and οζω, *to smell*) 1 Destitute of the sense of smell 2 Destitute of odour or aroma

A'NODYNES (*anodyna*, ανωδυνα, from α priv and οδυνη, *pain*) Narcotics Hypnotics Opiates Paregorics Antalgics Those medicines are so termed which ease pain and procure sleep

To ANO'INT *v a* (*oindre*, *enoindre*, part *oint*, *enoint* Fr) 1 To rub over with unctuous matter (*Shaks*) 2 To smear, to be rubbed upon (*Dryden*) 3 To consecrate by unction (*Shakspeare*)

ANO'INTER *s* (from *anoint*) The person that anoints

ANOLYMPIADES, those Olympic games which were celebrated under the direction of the Arcadians and Pisæans

ANO'MALISM *s* (from *anomaly*) Irregularity

ANOMALISTICAL YEAR, in astronomy, called also periodical year, is the space of time in which the earth, or a planet, passes through its orbit The anomalistical, or common year, is somewhat longer than the tropical year, by reason of the precession of the equinox And the apses of all the planets have a like progressive motion, by which it happens that a longer time is necessary to arrive at the aphelion, which has advanced a little, than to arrive at the same fixed star To find the anomalistic revolution, say, As the whole secular motion of a planet minus the motion of its aphelion, is to 100 years or 3155760000 seconds, so is 360°, to the duration of the anomalistic revolution.

ANO'MALOUS *a* (from α priv and ωμαλος) Irregular, out of rule, deviating from the general method or analogy of things (*Locke*).

ANO'MALOUS This term is often applied to those diseases whose symptoms do not appear with that regularity generally observed in diseases A disease is also said to be anomalous when the symptoms are so varied as not to bring it under the description of any known affection

ANO'MALOUSLY *ad* (from *anomalous*) Irregularly (*Brown*)

ANO'MALY *s* (*anomalie*, *Fr*) Irregularity, deviation from the common rule (*South*)

ANOMALY, in astronomy, is an irregularity in the motion of a planet, by which it deviates from the aphelion or apogee, or it is the angular distance of the planet from the aphelion or apogee, that is, the angle formed by the line of the apses, and another line drawn through the planet

Kepler distinguishes three kinds of anomaly, true, mean, and excentric

The true anomaly, or equated anomaly, as it is sometimes called, is the angle at the sun which is formed by the radius vector, or line drawn from the sun to the planet, and the line drawn from the sun to the aphelion of the planet the mean anomaly is the angular distance of a planet from its aphelion (taken at the same time with the true anomaly), supposing it to move uniformly with its mean angular velocity The difference between the true and mean anomaly is called the equation of the centre, or the prosthapheresis

If a circle be supposed drawn on the line of the apsides as a diameter, and through the place of the planet a perpendicular to the line of the apsides be drawn till it meet the circumference of the circle, then the angle formed by two lines, one drawn from the centre of the planet's orbit to the aphelion, and the other to the point where the perpendicular through the planet's place intersects the circumference of the circle, is called the excentric anomaly, or the anomaly of the centre

Thus, in fig 2 pl 5 where A B is the line of the apsides, and S the place of the sun, the planet being at P, the angle A S P is the true anomaly, A S D the mean anomaly (the circular trilineal A S D being to the whole circle, as the elliptic trilineal A S P to the whole ellipse), and A C D the excentric anomaly

The mean anomaly is always proportional to SG (a right line drawn perpendicular to DC produced) + the circular arc AD, as is shown in Keill's Lectures and other places

The true anomaly being given, it is easy to find the mean, in the following manner the excentricity cs being known, and RS or AC being expressed by unity, we have $CR = \sqrt{Rs^2 - sc^2}$, CH being perpendicular to AC; whence the ratio of AC to RC is known, and this is the ratio of DE to PF by the nature of the ellipse and circumscribing circle hence, the angle ASP being given, we have PE DE tang ASP tang ASD And in the triangle DSC, we know DC, SC, and the angle CSD, whence we find SCD, the supplement of which is SCG Then in the triangle SCG, we know SCG and SC, from which we get SG, which reduced to degrees, by reckoning 57° 14′ 44″ as equivalent to radius, or 1, and added to ACD, gives the mean anomaly

But the mean anomaly being given, it is not so easy to find the true, at least, by a direct process Kepler, who first proposed this problem, solved it by the rule of false position, as may be seen at p 695 of his Epitome Astron Copernic The solution has been attempted by some of the ablest mathematicians, we have not room to lay down the result of many of their investigations, and can only, therefore, present our readers with the excellent approximating rules of M de la Caille, which ascertain not only the true anomaly, but the planets relative distance from the sun

I As the aphelion distance is to the perihelion distance, so is the tangent of half the mean anomaly to the tangent of an arc, which added to that half, the sum is called the approximated excentric anomaly If the difference between the approximated and mean anomalies does not exceed 3 deg its difference from the true excentric anomaly will not amount to a second When this happens, which is always the case in the orbit of the earth, the next four articles become useless, nevertheless, as they are of utility in determining the true anomaly of the other planets, they are added II As half the greater axis is to the excentricity, so are 57° 17′ 44⅘″ (or 206264⅘″ whose logarithm is 5 3144250) to a number of seconds, which call A III As radius to the seconds A, so is the sine of the approximated excentric anomaly (I) to another number of seconds, which, taken from the mean anomaly, gives another approximated excentric anomaly IV As radius to the seconds A, so is the sine of the new approximated excentric anomaly to a number of seconds, which, subtracted from the mean anomaly, gives also another approximated excentric anomaly V This analogy must be repeated, always putting the sine of the last found approximated anomaly for the third term, till two be found successively, which are equal, then either will be the true excentric anomaly. VI As the square root of the aphelion distance is to the square root of the perihelion distance, so is the tangent of half the true excentric anomaly to the tangent of half the true anomaly sought If these anomalies should exceed 180°, their supplements, or half their supplements, must be used instead of these anomalies, or their halves VII. As radius to the co-sine of the true anomaly, so is the excentricity to a fourth quantity B, then, as half the greater axis, plus or minus the quantity B, to the perihelion distance, so is the aphelion distance to the distance sought B must be added in the 3d, 4th, 5th, 6th, 7th, and 8th signs of the true anomaly, but subtracted in the other signs

Much useful information on this subject may be obtained from Keill's Astron Cassini's Astron O Gregory's Astron ch xi Hutton's Mensura page 298, and Vince's Astron vol 1 p 105, &c See also the article EQUATION OF THE CENTRE, in this work

ANO'MIA In zoology, a genus of the class and order vermes testacea thus characterized Animal an emerginate ciliate strap-shaped body, with bristles or fringe affixed to the upper valve, arms two, linear, longer than the body, connivent, projecting, alternate on the valve, and ciliate each side, the fringe affixed to each valve shell bivalve, inequivalve, one of the valves flattish, the other gibbous at the base, with a produced beak, generally curved over the hinge, one of the valves often perforated near the base hinge with a linear prominent cicatrix and a lateral tooth placed within, but in the flat valve on the very margin two bony rays for the base of the animal Fifty-one species, spread through the different seas of the globe on its shores many of which, however, have only been found in a fossile state In this state two are occasionally met with in our own country, and the only ones that have yet been discovered the a cuspidata found in Derbyshire, and a spinosa found in other places as well

ANOMŒANS, in ecclesiastical history, the name by which the pure Arians were called in the fourth century, in contradistinction to the Semi-Arians The word is formed from the Greek, ανομοιος, different, dissimilar For the pure Arians asserted that the Son was of a nature different from, and in nothing like, that of the Father, whereas the Semi-Arians acknowledged a likeness of nature in the Son, at the same time that they denied, with the pure Arians, the consubstantiality of the Word

A'NOMY s (α priv and νομος) Breach of law (*Bramhall*)

ANO'N ad 1 Quickly, soon, in a short time (*Waller*) 2 Now and then, at other times (*Milton*)

ANO'NYMOUS a (α priv and ονομα) Wanting a name (*Ray*)

ANO'NYMOUSLY ad Without a name

ANO'RCHIDES (*anorchis*, ανορχις, from α priv and ορχις, *the testicle*) Children are so termed which come into the world without testicles This is a very common occurrence The testicles in the human subject begin to

descend about the seventh month of gestation, and about the eighth usually pass into the scrotum If the descent do not take place till after birth, it is generally a long time, and perhaps many years before it is accomplished See TESTES

ANOREXIA (*anorexia*, from α priv and ορεξις, *appetite*) A want of appetite, without loathing of food Cullen ranks this genus of disease in the class locales, and order dysorexiæ, he believes it to be generally symptomatic, but enumerates two species, viz the anorexia humoralis and the anorexia atonica

ANOSMIA (*anosmia*, ανοσμια, from α priv and οζω, *to smell*) A loss of the sense of smelling This genus of disease is arranged by Cullen in the class locales, and order dysæsthesiæ When it arises from a disease of the Schneiderian membrane, it is termed anosmia organica, and when from no manifest cause, anosmia atonica

ANOSSI, CARCAURSI, or ANDROBEIZAHA, in geography, a province of Madagascar, situate in S lat 23 18, and extending from the province of Manatengha to the river Mandrerei, in lat 26

ANOTHER *a* (from *an* and *other*) 1 Not the same (*Locke*) 2 One more (*Shakspeare*) 3 Any other (*Samuel*) 4 Not one's self (*South*) 5 Widely different (*South*)

ANOTHERGAINES *a* Of another kind obsolete (*Sidney*)

ANOTHERGUESS *a* Of another kind a low word (*Arbuthnot*)

ANOTTA, or ARNOTTA, in dyeing, an elegant red colour, formed from the pellicles or pulp of the seeds of the bixa, a tree common in South America It is also called Terra Orleana, and roucou In making it, the red seeds are steeped in water till the liquor begins to ferment, then strongly stirred and stamped with wooden beaters, to promote the separation of the red skins this process is repeated several times, till the seeds are left white The liquor passed through close cane sieves is pretty thick of a deep red colour, and a very ill smell In boiling, it throws up its colouring matter to the surface in form of scum, which is afterwards boiled down by itself to a due consistence and made up while soft into balls To rectified spirit of wine it very readily communicates a high orange or yellowish red, and hence is used as an ingredient in varnishes, for giving an orange-cast to the simple yellows Alkaline salts render it perfectly soluble in boiling water, without altering its colour Wool or silk boiled in the solution acquires a deep, but not a very durable orange-dye

ANOTTA, in botany See BIXA

ANSÆ, in astronomy, implies the parts of Saturn's ring projecting beyond the disk of the planet The word properly signifies handles, those parts of the ring appearing like handles to the body of the planet

ANSARIANS, a people of Syria, so called in the country, but styled in Delisle's maps Ensarians, and in those of Danville, Nassaris. The territory occupied by these Ansaria is that chain of mountains which extends from Antakia to the rivulet called Nahr-el-Kahr, or the Great River

ANSATED *a* (*ansatus*, Lat) Having handles

ANSATUS, in conchology, a species of murex

ANSER, in astronomy, a star of the fourth or fifth magnitude, in the milky way, lying between Lyra and Aquila

ANSERES In zoology, the third order of the Linnean class aves thus ordinally characterised Bill smooth, covered with a soft skin, and broader at the point, feet formed for swimming, toes palmate, connected by a membrane, shanks short, compressed, body fat, downy, flesh mostly tough, food fishes, frogs, aquatic plants, worms, &c nest mostly on the ground, the mother takes but little care in providing for the young frequently polygamous For the genera, see ZOOLOGY

ANSERINA (*anserina*, from *anser*, a goose, so called because geese eat it) Wild tansey or goose-grass Argentia This herb, potentilla anserina, foliis pinnatis serratis, caule repente, pedunculis unifloris of Linnéus, was formerly used as an astringent in laxity of the intestines and phthisical complaints, but is now fallen into disuse

ANSES See ANSÆ

ANSIKO, a kingdom of Africa, bounded on the W by the river Umbre, on the N by some deserts of Nubia, and on the S by Songo and Sunda, provinces of Congo

ANSON (George, lord), was the son of William Anson, esq of Huckborough in Staffordshire, at whose seat he was born in 1697 He went to sea very early, and in 1724 was made post-captain Being sent to South Carolina, he purchased land, and built a town there, which is called after his name In 1739 he was chosen commander of an expedition against the Spanish settlements in South America, and sailed from Portsmouth, September 18, 1740, with five men of war, a sloop, and two victuallers He doubled cape Horn in March 1741, after losing two of his ships In June following he arrived off Juan Fernandez, with no more than two ships, two tenders, and only 335 men This place he left in September, took some prizes, burnt Paita, and continued on the American coast, in expectation of falling in with the annual Acapulco ship, till May 1742, when having only his own ship, the Centurion of 64 guns, left, he crossed the southern ocean for China, where he staid several months, and then returned in quest of the galleon, which he fell in with, and captured after a smart action Having sold his prize in China, he sailed for England, and arrived at Spithead, June 15, 1744, having sailed in a fog through the midst of the French fleet, then cruizing in the Chops of the Channel Not long after his return he was made rear-admiral of the blue, and one of the lords of the admiralty He was also chosen member

of parliament for the borough of Heydon In 1747, he commanded the Channel fleet, and fell in with six French men of war, and four East-Indiamen, all of which he captured For these services he was created by George II lord Anson, baron of Soberton, in Hants, and on the death of sir John Norris, he was appointed vice-admiral of England In 1751, he was appointed first lord of the admiralty, which post he held, with a slight interval, till his death In 1758, he commanded the Channel fleet, having under him the gallant sir Edward Hawke After this he was appointed admiral and commander-in-chief of his majesty s fleets The last service he was engaged in, was in convoying to England her present majesty He died suddenly at his seat at Moorpark, in Hertfordshire, June 6, 1762 He married a daughter of the late earl of Hardwicke, who died before him without issue Lord Anson was a cool and steady man, but too fond of play, of which he knew but little, so that he was the constant dupe of sharpers, this made some person say smartly, that "though he had been round the world, he was never in it " His Voyage round the World was drawn up under his own eye, by Mr Benjamin Robins, though published in the name of the chaplain, Mr Walter

ANSPACH, a town and castle of Franconia, and capital of the margravate of Anspach It is seated on a river of the same name Lat 49 20 N Lon 10 47 E

ANSTRUTHER, a borough on the SE coast of Fifeshire Lat 56 15 N Lon 2 34 W

To A'NSWER *v n* (anꝺꝼpaꞇian, Saxon) 1. To speak in return to a question (*Dryden*) 2 To speak in opposition (*Boyle*) 3 To be accountable for (*Brown*) 4 To vindicate, to give a justificatory account of (*Swift*) 5 To give an account (*Temple*) 6 To correspond to, to suit with (*Prov*) 7 To be equivalent to (*Ecclesiasticus*) 8 To satisfy any claim or petition (*Raleigh*) 9 To act reciprocally (*Dryden*) 10 To stand as opposite or correlative to something else (*Taylor*) 11 To bear proportion to (*Swift*) 12 To perform what is endeavoured or intended by the agent (*Atterbury*) 13 To comply with (*Shakspeare*) 14 To succeed, to produce the wished event (*Bacon*) 15 To appear to any call, or authoritative summons (*Shaksp*) 16 To be over against any thing (*Shak*)

A'NSWER *s* (from the verb) 1 That which is said in return to a question, or position (*Atterbury*) 2 Confutation of a charge (*Ayliffe*)

A'NSWER-JOBBER *s* He that makes a trade of writing answers (*Swift*)

A'NSWERABLE *a* (from *answer*) 1 That to which a reply may be made 2 Obliged to give an account (*Swift*) 3 Correspondent (*Sidney*) 4 Proportionate (*Milton*) 5 Suitable; suited (*Milton*) 6 Equal, equivalent (*Raleigh*) 7 Relative, correlative (*Hooker*)

A'NSWERABLENESS *s* (from *answerable*) The quality of being answerable

A'NSWERABLY *ad* (from *answerable*) In due proportion, with proper correspondence, suitably (*Brerewood*)

A'NSWERER *s* (from *answer*) 1 He that answers 2 He that manages the controversy against one that has written first (*Swift*)

AN'T A contraction for *and it*, or *and if it*

ANT, in entomology See FORMICA

ANT-BEAR and ANT-EATER See MYRMECOPHAGÆ

ANT-HILLS, in husbandry, little hillocks of earth which the ants throw up for their habitation for the breeding their young They are a very great mischief to dry pastures, not only by wasting so much land as they cover, but by hindering the scythe in mowing the grass, and yielding a poor hungry food, pernicious to cattle

ANTA, in the ancient architecture, a square pilaster, placed at the corners of buildings Anta is used by M Le Clerc for a kind of shaft of a pillar, without base or capital, and even without any moulding

ANTA, in zoology See TAPIR

ANTA'CIDS (*antacida*, sc *medicamenta*, from *anti*, against, and *acidus*, acid) Those medicines that have the power of destroying acidities in the stomach and intestines The remedies which possess this power are comprehended in two orders 1 Eccoprotic antacids as magnesia alba, tartarum solubile, sapo, and all alkaline preparations, which are also calculated to remove costiveness 2 Restringent antacids, as creta, oculi cancrorum testæ ostreorum, and other forms of the carbonat of lime, which are to be selected when there is a looseness of the bowels

ANTA'CRIDA ANTA'CRIDS (from ἀντι, *against*, and *acris*, sharp) Medicines which correct or destroy acrimony

ANTÆ, in ancient architecture, square pilasters placed at the corners of gateways, walls, &c of temples

ANTÆUS, in fabulous history, a giant of Libya, son of Neptune and Terra Designing to build a temple to his father of men s skulls, he slew all he met, but Hercules fighting him, and perceiving the assistance he received from his mother, lifted him up from the ground, and squeezed him to death

ANTA'GONIST *s* (ἀντι and ἀγωνίζω) 1 One who contends with another, an opponent (*Milton*) 2 Contrary (*Addison*)

ANTA'GONIST MUSCLES (*musculi antagonisti*, from ἀντι, *against*, and ἀγωνίζω, *to strive*) Muscles are so called, which act in opposition to others

To ANTA'GONIZE *v a* (ἀντι and ἀγωνίζω) To contend against another

ANTAGORAS The most remarkable of this name was a Rhodian poet, much admired by Antigonus One day as he was cooking some fish, the king asked him whether Homer ever dressed any meals when he was recording the actions of Agamemnon? And do you think, replied the poet, that he ὤλαει τ᾽ ἐπιτετραφαται

και τοσα μιμιλα, ever enquired whether any individual dressed fish in his army? *Plut*

ANTA'LGICA ANTALGICS (*antalgica, sc medicamenta*, ανταλγικα, from αντι, *against*, and αλγος, *pain*) Remedies which ease pain Anodynes

ANTA'LKALINES (*antalkalina, sc medicamenta*, from *anti*, against, and *alkali*, an alkali) Medicines which possess the power of neutralizing alkalis

ANTANACLA'SIS *s* (from ανλανακλασις) 1 A figure in rhetorick, when the same word is repeated in a different manner, if not in a contrary signification 2 It is also a returning to the matter at the end of a long parenthesis (*Smith*)

ANTAPHRODI'TICK *a* (from αντι and αφροδιτη) Efficacious against the venereal disease

ANTAPOPLEC'TICK *a* (from αντι and αποπληξις) Good against an apoplexy

ANTARADUS, in ancient geography, a town of Syria, commonly called Tortosa

ANTARCTICK *a* (αντι and αρκτος) Something opposite to the arctic or northern pole Thus, an arctick pole is the south pole, and antarctick circle is a less circle of the sphere, at the distance of 23° 28′ from the south pole

ANTARES, in astronomy, a star of the first magnitude, marked α in Scorpio, and often called C or Scorpio

ANTARTHRI'TICS (from αντι, *against*, and αρθριτις, *diseases of the joints*, as rheumatism or gout) Remedies against these and similar maladies

ANTASTHMA'TICS (from αντι, *against*, and ασθμα, *an asthma*) Remedies against an asthma

ANTATRO'PHICS (from αντι, *against*, and ατροφια, *a consumption, or decline*) Medicines which oppose, or relieve consumptions

ANTAVARI, in geography, a province of Madagascar, is situated to the north of Matatane, in 21 30 of S lat and bounded by the province and cape of Manousi

ANTE, in heraldry, denotes that the pieces are let into one another in such form as is there expressed, as, for instance, by dove-tails, rounds, swallows tails, or the like

A'NTE A Latin particle signifying *before*, which is frequently used in composition, as, antediluvian, before the flood

A'NTEACT *s* (from *ante* and *act*) A former act

ANTEAMBULA'TION *s* (from *ante* and *ambulo*, Lat) A walking before

ANTEAMBULONES, in Roman antiquity, servants who cleared the way before persons of distinction

ANTECANIS, a name sometimes given to the constellation Canis minor

To ANTECE'DE *v n* (from *ante* and *cedo*, to go) To precede, to go before (*Hale*)

ANTECE'DENCE *s* (from *antecede*) The act or state of going before (*Hale*)

ANTECE'DENT *a* (*antecedens*, Latin) Going before, preceding (*South*)

ANTECE'DENT *s* (*antecedens*, Latin) 1 That which goes before (*South*) 2 [In grammar] The noun to which the relative is subjoined (*Ascham*) 3 [In logick] The first proposition of an enthymeme (*Watts*)

ANTECEDENT OF A RATIO, in mathematics, denotes the first term, or that which is compared with the other.

ANTECEDENTAL METHOD, a branch of general geometrical proportion, derived from an examination of the antecedents of ratios, having given consequents, and a given standard of comparison, in the various degrees of augmentation and diminution, which they undergo by composition and decomposition This was invented by Mr James Glenie, and published by him in 1793, which he says he always used instead of the fluxional and differential methods, and which is totally unconnected with the ideas of motion and time We do not learn, however, that any of our most active mathematicians have availed themselves of this calculus and if we estimate it by its practical utility, we shall probably not find it productive of such advantages as its very learned author expected from it. This method, and that called the Residual Analysis, are monuments of the genius and profound knowledge of their respective inventors but we do not conceive that any real benefit would accrue to science, by substituting either of them in place of the method of fluxions

ANTECEDENTIA, a term applied by astronomers to denote that apparent motion of a planet, or other heavenly body, which is westward, or contrary to the order of the signs Aries Taurus, &c

ANTECE'DENTLY *ad* (from *antecedent*) Previously (*South*)

ANTECESSOR *s* (Latin) One who goes before, or leads another, the principal

ANTECHA'MBER *s* (from *ante* and *chamber*) The chamber that leads to the chief apartment (*Addison*)

ANTECU'RSOR *s* (Latin) One who runs before, a forerunner

To A'NTEDATE *v a* (from *ante* and *do, datum*, Latin) 1 To date earlier than the real time (*Donne*) 2 To take something before the proper time (*Pope*)

ANTEDILU'VIAN, *a* (from *ante* and *diluvium*, a deluge) 1 Existing before the deluge (*Woodward*) 2 Relating to things existing before the deluge (*Brown*)

ANTEDILUVIANS, a general name for all mankind who lived before the flood, and in which are included the whole of the human race from Adam to Noah and his family

ANTEGO, or ANTIGUA, one of the Antilles or Caribbee isles, situated 20 leagues east of St Kitt's, in lat 17 4 N lon 62 9 W It is about 50 miles in circuit

ANTEJURAMENTUM, an oath which anciently both accuser and accused were to take before any trial or purgation

ANTELO'PE Antelope, A genus of the class and order mammalia pecora Horns

hollow, persistent, round, twisted spirally, or annulate; fore-teeth lower eight, tuskless. Twenty-eight species; inhabitants of all the continents but America, in which none have hitherto been discovered They are chiefly found in hilly countries, climb up rocks, browse and feed on tender shoots, are very gregarious, active, timid, and swift, have gall-bladders and lachrymal pits under the eyes, a fold of skin divided into cells in the groins, brushes of hair on the knees, and beautiful black eyes, the flesh is in general good, but some have a rank or musky smell See Nat Hist pl XX' XXI Those most worthy of notice are,

1 A rupicapra Chamois Horns erect, round, smooth, tips hooked back Inhabits the Alps in troops, feeds on shrubs, herbs, and roots size that of a goat, flesh good

2 A saiga Scythian antelope Horns distant, lyre-shaped, almost diaphanous, nose cartilaginous, arched Inhabits Russia and Poland as far as the Altain Alps, in open deserts abounding in salt springs, timid, swift, gregarious in autumn, and migrates into southern deserts, bleats like a sheep, quick of smell, when feeding or sleeping is always guarded by a centinel walks backward while grazing; runs with the head very erect Female hornless, brings usually one young, of a balsamic odour, flesh hardly eatable

3 A gnu, or Gnou Horns bent forwards at the base, backwards in the middle, neck maned, tail dirty white Inhabits the plains of Africa behind the Cape of Good Hope, feeds in large troops, fierce, fights with its horns, resembling in its head an ox, body and tail, a horse, thighs, a stag, fur and lachrymal duct, the antelope, flesh good, three feet and a half high, six and a half long

4 A gazella Gazelle Horns tapering, a little bent inwards, wrinkled Inhabits India, Persia, Egypt, Ethiopia, in herds, runs swiftly up hills, easily tamed In a variety named abomasus is found a greenish blue bezoard, (esteemed the real), and when recent very aromatic, body red above, white beneath

5 A oreas Indian antelope Horns tapering, straight, spirally carinate, body grey Inhabits India, Congo, and the Cape gregarious, grows very fat, flesh good, horns are made into tobacco pipes by the natives from five to eight feet high, horns two feet, dark brown

6. A. sylvatica Wood antelope Horns a little spirally twisted, carinate, sharp, smooth at the tips, body above brown behind spotted with white, beneath chiefly white Inhabits woods near the Cape of Good Hope lives in pairs; three feet high, body marked in various places with white spots, reddish brown, horns black, from ten to thirteen inches long, females hornless, neck and back a little maned flesh good.

7. A. cervicapra Common antelope Horns spiral, round, annulate, body brown, beclouded with reddish and dusky Inhabits Africa and India less than the deer.

8 A leucophæa Blue antelope Horns recurvate, roundish, annulate, body bluish. Inhabits the Cape of Good Hope, larger than the deer, body beneath white, under the eye and on the foot a white blotch, tail seven inches, white, a little tufted at the tip, horns twenty inches long, rings twenty, tip smooth, hair long

ANTELUCAN, in ecclesiastical writers, is applied to things done in the night, or before day

ANTELUDIA, in antiquity, a day of parade preceding the circenses

ANTEMERIDIAN *a* Before noon

ANTEMETICS (from ἀντι and ἐμεω, *to vomit*) Medicines which relieve vomiting

ANTEMURALE (from *ante*, and *murus*, wall) In middle age writers, denotes a kind of outer wall environing the other walls and works of a place, and preventing the too near access of the enemy to them

ANTENATI, in modern English history, is chiefly understood of the subjects of Scotland, born before king James the First's accession to the English crown, and alive after it In relation to these, those who were born after the accession were denominated postnati The antenati were considered as aliens in England, whereas the postnati claimed the privilege of natural subjects

ANTENCLEMA, ἀντεγκλημα, in oratory, is where the whole defence of the person accused turns on criminating the accuser Such is the defence of Orestes, or the oration for Milo Occisus est sed latro Exsectus sed raptor

ANTENICENE, in ecclesiastical writers, denotes a thing or person prior to the first council of Nice

ANTENNÆ, Antennas, the horn-like processes projecting from the head of insects

ANTENOR, a Trojan prince related to Priam It is said, that during the Trojan war, he always kept a secret correspondence with the Greeks In the council of Priam, Homer introduces him as advising the Trojans to restore Helen, and conclude the war He advised Ulysses to carry away the Trojan palladium, and encouraged the Greeks to make the wooden horse, which, at his persuasion, was brought into the city of Troy by a breach made in the walls Æneas has been accused of being a partner of his guilt After the destruction of his country, Antenor migrated to Italy near the Adriatic, where he built Padua

ANTENUPTIAL, something that precedes marriage

ANTEPAGMENTA, in ancient architecture, is used for the jambs of a door, lintels of a window, or carved ornaments of men, animals, &c set upon the architraves

ANTEPENULTIMA, or Antepenultimate, in grammar, the third syllable of a word, reckoning from the latter end, or the last syllable except two The word is compounded of the preposition ante, before, and penultimate, last but one, or pene ultimam.

ANTEPHIALTICS (from ἀντι and ἐφιαλτ,

the incubus, or *night-mare*) Medicines which prevent this disease

ANTEPILEPTICS, in medicine, denotes a quality in remedies, whereby they prevent, diminish, or cure, epileptic fits

ANTEPOSITION (from *ante*, and *pono*, I place) A grammatical figure, whereby a word which by the ordinary rules of syntax ought to follow another, comes before it As when in the Latin the adjective is put before the substantive, the verb before the nominative case, &c

ANTEPREDICAMENTS, among logicians, certain preliminary questions which illustrate the doctrine of predicaments and categories

ANTEQUERA, in geography, a town of Spain, in the kingdom of Grenada, containing about 13,000 inhabitants, built by the Moors, on the ruins of the ancient Singilia, divided into parts or quarters, one of which is situated on a hill much above the rest, where are the castle and the houses of the nobility It is 26 miles NNW from Malaga, and 54 W from Grenada Lon 4 40 W Lat 37 6 N

ANTERIDES, in architecture, buttresses

ANTERIOR AURIS One of the common muscles of the ear, situated before the external ear It arises, thin and membranous, near the posterior part of the zygoma, and is inserted into a small eminence on the back of the helix, opposite to the concha, which it draws a little forwards and upwards

ANTERIOR INTERCOSTAL NERVE Splanchic nerve A branch of the great intercostal that is given off in the thorax

ANTERIOR MALLEI See LAXATOR TYMPANI

ANTERIOUR *a* Going before

ANTEROS (ἀντι ἐρω, *against love*) A son of Mars and Venus He did not, as the name imports, preside over an opposition to love, but he was the god of mutual love, &c Venus had complained to Themis, that her son Cupid always continued a child, and was told, that if he had another brother, he would grow up in a short space of time As soon as Anteros was born, Cupid felt his strength increase, and his wings enlarge, but if ever his brother was at a distance from him, he found himself reduced to his ancient shape From this circumstance it is seen, that return of passion gives vigour to love They were always painted in the Greek academies, to inform the scholars that it is their immediate duty to be grateful to their teachers, and to reward their troubles with love and reverence

ANTES, in architecture See ANTÆ

ANTESTARI, in Roman antiquity, signifies to bear witness against any one who refused to make his appearance in the Roman courts of judicature, according to the tenor of his bail The plaintiff, finding the defendant after such a breach of his engagement, was allowed to carry him into court by force, having first asked any of the persons present to bear witness The person so asked expressed his consent by turning his right ear, which was instantly taken hold of by the plaintiff, and this was to answer the end of a subpœna

ANTESTOMACH *s* (from *ante* and *stomach*) A cavity that leads into the stomach.

ANTHELION See HALO and PARHELION

ANTHELIX, in anatomy, the inward protuberance of the external ear, being a semicircle within, and almost parallel to the helix

ANTHELMIA, Indian pink See SPIGELIA

ANTHELMINTICS. (*anthelmintica*, sc *medicamenta*, ανθελμινθικα, from αντι, *against*, and ελμινς, *a worm*) Antithelmintics Medicines which procure the removal of worms from the human stomach and intestines This class of medicine comprehends four orders 1 Venenous anthelmintics, as mercurial preparations, tin, and sulphur, which are principally adapted to strong and robust habits, those in the prime of life, and where there is a degree of torpor of the intestines 2 Lubricating anthelmintics, as common and linseed oil, which are best calculated for reduced habits. 3 Tonic anthelmintics, as sabina, tanacetum, and santonicum, which are principally adapted for children and delicate habits 4 Cathartic anthelmintics, as scammonium, jalappa, aloe, and gambogia The constitutions in which these are to be preferred are the strong and robust, and those in the prime of life

ANTHEM (from αντι, and υμνος, *a hymn*) A church-song performed in cathedral and other service, by the choristers, divided for that purpose into choruses, who sing alternately The word was originally used both for psalms and hymns, when thus performed

At present, the term is used in a somewhat narrower sense, being applied to certain passages taken out of the Psalms, &c and often accommodated to the particular solemnity in hand Anthems were first introduced into the reformed service of the English church in the beginning of the reign of queen Elizabeth

ANTHEMIS (from ανθος, *a flower*) Chamomile a genus of the class and order syngenesia polygamia superflua Receptacle chaffy, seeds generally crowned with a slight border, calyx hemispherical, nearly equal, florets of the ray more than five, oblong Thirty-nine species, chiefly natives of the south of Europe and the Barbary coasts five are indigenous to our own country, the a maritima, a nobilis; a arvensis, a cotula, a tinctoria

ANTHEMIS COTULA (*cotula*, a dim of *cos*, a whetstone, so called from its leaves resembling a whetstone) The systematic name for the plant called cotula fœtida in the pharmacopœias See COTULA FŒTIDA.

ANTHEMIS NOBILIS The systematic name for the chamœmelum of the shops. See CHAMŒMELUM

ANTHEMIS PYRETHRUM The plant is so called from which we obtain the pyrethrum of the pharmacopœias See PYRETHRUM

ANTHER (ανθηρα *anthera*) Apex of Ray, capsula staminis of Malpighi Summit, semet, pendent, or tip, of Grew and other

English writers Pars floris gravida polline, quod maturum dimittit or fœta granulato pollne, et hæc fovilla A part of the flower, big with pollen or farina, which it emits or explodes when ripe or, big with granulated pollen, and that with fovilla Or, it may be defined to be a vessel destined to produce and emit a substance for the impregnation of the germ. It forms a part of the stamen, and is placed on the top of the filament

There is generally one anther to each filament, in cucurbita, however, there is one to three; and in the class syngenesia, one to five filaments In mercurialis we find two, in fumaria three, anthers to a filament, in bryonia, five to three filaments, in theobroma, five to each In some flowers anthers are regularly wanting on one or more of the filaments as in chelone and Martynia, one—in pinguicula and verbena, two—in gratiola, bignonia, and some geraniums, three—in curcuma, four—in pentapetes and other geraniums, five, These are called barren filaments

Anthers are connected

By the base, in most flowers By the top, in colchicum By the side, in canna, amomum By the nectary, in costus

Their situation is

On the top of the filaments, in most flowers On the side, in Paris and asarum On the pistil, in aristolochia On the receptacle, in arum, annona

They burst

On the side, in leucoium, and most flowers At the top, in galanthus and kiggelaria From the base upwards, in epimedium and leontice

They are

Distinct, separate, not cohering Globularia —Connate, coalescent, united Solanum, syngenesia —Twin (didymæ), swelling outwards with two knots Boerhaavia, salicornia, blitum, ammannia, potamogeton

Upright, pointing upwards Salicornia, ligustrum, olea, chionanthus, verbascum, tulipa —Incumbent, horizontal, and then versatile, being fixed only in the middle so as to move freely Gladiolus, globularia, dipsacus, scabiosa, passiflora

Exsert, or standing out or beyond the corolla, in some species of erica —Included, or inclosed within it Jasminum, syringa, primula,

Awned, ending in an awn, in some species of erica —Horned (bicornes), cloven at the tip, and the clefts spreading like horns, in some species of erica, andromeda, pyrola —Crested, terminating in a crest, in some species of erica

Their figure is

Oblong, in lilium, grasses Globular, in mercurialis Sagittate, or shaped like the head of an arrow, in crocus, nolana, soldanella, dodecatheon nerium, linum, bromelia Angular, in tulip Horned, in hamamelis, erica, vaccinium, pyrola, Forked (bifurcatæ), in most grasses Linear, in haliocarpus, stapelia, [illegible], protea, coffea, liriodendrum, magnolia [illegible], or awl shaped, in roella, cornus Lanceolate, or shaped like the head of a spear, in banksia Hastate, or shaped like the head of a halbert, in Jacquinia Cordate, or heart-shaped, in capraria, tinus, bucida, malphigia, thea Reniform, or kidney-shaped, in ginora, tradescantia, and the class monadelphia Ovate, or egg-shaped, in limeum, gladiolus, commelina, convolvulus Three-cornered, (trigona), in rosa Four-cornered (tetragona), in cannabis, populus, dictamnus, cestrum, arum, cannabis Lunular, or shaped like a crescent, in fragaria, comarum Spiral, or twisted like a screw, chironia

They have only

One cell, in mercurialis Two cells, in epimedium, asclepias, daphne, helleborus Three cells, in orchis Four cells, in fritillaria, tropæolum, pæonia, salix

ANTHE'RICUM Spider-root a genus of the class and order hexandria monogynia Corol six-petalled, spreading, permanent filaments filiform, capsule superior seeds angular, calyxless There are fifty-four species, almost all of them Cape plants The a serotinum, however, is also found on the Welsh mountains, but is the only species indigenous to Britain They may be divided into those, 1 with leaves channelled, filaments mostly bearded 2 leaves fleshy, bearded filaments 3 stamens dilated in the middle, root bulbous

ANTHERI'LIUM In botany, a genus of the class and order icosandria monogynia Calyx inferior, four-parted, petals four, capsule one-celled, three-valved, many-seeded The only known species is a tree in St Thomas's island

ANTHESPHORIA, an ancient Sicilian festival, in honour of Proserpine

ANTHESTERIA, in antiquity, a feast celebrated at Athens in honour of Bacchus

ANTHESTERION, in ancient chronology, the sixth month of the Athenian year It contained twenty nine days, and answered to the latter part of our November and beginning of December

ANTHINE, among ancient naturalists, an appellation given to certain species of wine and oil

ANTHISTI'RIA In botany, a genus of the class and order polygynia monœcia Herm , florets sessile, male florets pedicelled Calyx, glume four-valved, three or four-flowered coriaceous, corol, glume two valved, awnless, filaments three, styles two, stigmas clavate, seed one One species alone, the a ciliata, of Indian growth

ANTHOCEROS In botany, a genus of the class and order cryptogamia hepaticæ Male calyx six-parted, or entire, anthers from three to eight, obovate, at the bottom of the calyx Four species, of which two are natives of our own wastes and commons

ANTHO'LOGY s (ἀνθολογία) 1 A collection of flowers. 2 A collection of devotions 3 A collection of poems

ANTHOLO'MA In botany, a genus of the class and order polyandria monogynia Calyx from two to four-leaved, corol cup-

shaped, capsule ? four-celled, many-seeded The only known species is a shrub of New Caledonia

ANTHOLY'ZA In botany, a genus of the class and order triandria monogynia Corol tubular, six cleft, unequal, recurved, capsule inferior Six species, all natives of the Cape generally with red or scarlet corols, and mostly very elegant

ANTHO'NII SANCTUS IGNIS The erysipelas, or ignis sacer of the Romans called St Anthony's fire, because he was supposed to be endowed with a miraculous power of curing it He is yet addressed in the Roman missals as the preserver from all sorts of fire

ANTHONY (Knights of), an order of knighthood, established in 1382, by Albert of Bavaria, &c who had then taken a resolution to make war against the Turks The knights of this order wore a collar of gold, with a hermit's girdle, to which hung a crutch and a little bell Some authors mention another order of St Anthony in Ethiopia, instituted in 370, by Prester John

St Anthony also gives the denomination to an order of religious founded in France about the year 1095, under the pontificate of Urban II to take care of those afflicted with St Anthony's fire

ANTHO'PHYLLI (*anthophyllus*, ανθοφυλλον, from ανθ, *a flower* and φυλλον *a leaf*, so called from the fragrance of the flowers and the beauty of the leaves) Cloves are so termed when they have been suffered to grow to maturity

ANTHROPO'LOGY (ανθρωπο and λογω) The doctrine of the form and structure of man

ANTHROPOMO'RPHITE (ανθρωπομορφο) One who believes a human form in the deity (*Locke*)

ANTHROPO'PATHY (ανθρωπος and παθος) The passions of man

A'NTHORA (*quasi antithora*, αντιθορα from αντι *against*, and θορα, *monkshood*, so called because it is said to counteract the effects of the thora or monkshood) Wolfsbane The root is the part of this plant (aconitum anthora, floribus pentagynis, foliorum laciniis linearibus of Linneus), which is employed medicinally Its virtues are similar to those of the aconitum, see ACONITUM

ANTHORISMUS, in rhetoric, denotes a contrary description or definition of a thing from that given by the adverse party Thus, if the plaintiff urge, that to take any thing away from another without his knowledge or consent, is a theft, this is called ορος, or definition If the defendant reply, that to take any thing away from another without his knowledge or consent, provided it be done with design to return it to him again, is not theft; this is an ανθορισμος

A'NTHOS, ANTHUS (from ανω, *upwards*, and θεω, *to run*) 1 The anther, or uppermost part of the stamen of a flower 2 The entire flower, or corol itself 3 The flosculent parts or flowers of minerals 4 The aroma or fine volatile parts, or essences of spirits and other chemical preparations

ANTHOSPE'RMUM Amber tree a genus of the class and order diœcia tetrandria. Calyx four parted, corolless Fem pistils two, germ inferior, four-sided Three species, natives of Africa two of them of the Cape

ANTHOXA'NTHUM Vernal grass a genus of the class and order diandria digynia. Calyx, glume two valved, one-flowered, corol, glume two-valved, pointed, awned, seed one Four species, of which the a odoratum is common to our own meadows, and chiefly gives the fragrance to our new-mown hay, the a secunda of Malabar resembles an avena

ANTHRA'CIA, ANTHRAX (*anthrax*, ανθραξ, *a burning coal*) Carbunculus A hard and circumscribed inflammatory tubercle like a boil, which sometimes forms on the cheek, neck, or back, and in a few days becomes highly gangrenous It then discharges an extremely fetid sanies from under the black core, which, like a burning coal continues to destroy the surrounding parts It is supposed to arise from a peculiar miasm, and is most common in warm climates

A'NTHRAX, a tribe, or family of the genus bombilius See BOMBILIUS

ANTHRE'NNUS In zoology, a genus of the class and order insectæ coleoptera Antennas clavate the club solid, feelers unequal, filiform, jaws membranaceous linear, bifid, lip entire head hid under the thorax Thirteen species all inhabitants of the continent of Europe except a scrraticornis and a denticornis, both of which are residents in Santa Cru

A'NTHRIBUS, a tribe of Fabricius See CURCULIO

ANTHRI'SCUS, in botany See CHÆROPHYLLUM

ANTHROPOGLOTTUS, among zoologists, an appellation given to such animals as have tongues resembling those of mankind, particularly the parrot kind

ANTHROPOLATRÆ, in church history, an appellation given to the Nestorians, on account of their worshipping Christ, notwithstanding that they believed him to be a mere man

ANTHROPOLITES, a term denoting petrifactions of parts of the human body, as those of quadrupeds are called zoolites

ANTHROPOLITHUS In oryctology a genus of the class petrifactions, consisting of the human body, or some of its parts, changed into a fossile substance Two species have been found

1 A totalis Petrified entire skeleton (Zoolitus hominis of Linneus Syst Nat), discovered at Fahlun in Sweden, imbedded in a mass of sulfuret of iron, or pyrites, and (as is asserted) converted into a hard stone in the year 1585 discovered also in some mineral waters in France, and in others near Freyburg in Saxony

2 A partialis Petrified cranium, or other bones a specimen of the former of which has been found in the mountains near Rheims in France

ANTHROPOMORPHISM, among eccle

siastical writers, denotes the heresy or error of the Anthropomorphites

ANTHROPOMORPHITES, in church history, a sect of ancient heretics, who, taking every thing spoken of God in Scripture in a literal sense, particularly that passage of Genesis in which it is said, God made man after his own image, maintained that God had a human shape They are likewise called Audeans, from Audeus their leader

ANTHROPOPHAGI (from ανθρωπος, *a man*, and φαγω, *to eat*) Men-eaters That there have been, in almost all ages of the world, nations who have followed this barbarous practice, we have abundance of testimonies The Cyclops, the Lestrygons, and Scylla, are all represented in Homer as anthropophagi, or men-eaters According to Herodotus, among the Essedonian Scythians, when a man's father died, the neighbours brought several beasts which they killed, mixed up their flesh with that of the deceased, and made a feast

Of the practice of anthropophagy in later times, we have the testimonies of all the Romish missionaries who have visited the internal parts of Africa, and even some parts of Asia Dr Hawkesworth's Account of the Voyages to the South Seas renders it pretty certain, that the inhabitants of the island of New Zealand, a country unfurnished with the necessaries of life, eat the bodies of their enemies

The annals of Milan furnish an extraordinary instance of anthropophagy in a Milanese woman, who had an invincible inclination to human flesh, which she gratified by enticing children into her house, where she killed and salted them A discovery of this having been made, she was broken on the wheel and burnt in 1519

ANTHROPOPHAGINIAN s A ludicrous word, formed from anthropophagi (*Sh*)

ANTHROPOPHAGY s (ανθρωπος and φαγω) The quality of eating human flesh (*Brown*)

ANTHROPOSOPHY s (ανθρωπος and σοφια) The knowledge of the nature of man

ANTHROPOTHYSIA, the ancient horrid practice of offering human sacrifices

ANTHYLLIS Kidney-vetch, or lady's-finger, a genus of the class and order diadelphia decandria Calyx inflated, legume roundish, invested with the calyx, stamens all united at the base Twenty-one species, some herbaceous, some shrubby chiefly natives of Africa or the south of Europe The a vulneraria is the only vetch indigenous in our own country it is a triennial, with bright scarlet flowers The rest are most of them cultivated in our gardens for their beauty

ANTHYPNOTICS (from αντι and υπνος, *sleep*) Medicines that prevent drowsiness, or coma

ANTHYPOPHORA s (ανθυποφορα) A figure in rhetorick, which signifies a contrary allation, or inference (*Smith*)

ANTI. (αντι) A particle much used in composition with words derived from the Greek, which gives them an opposite meaning to their original as antiasthmatics, or antasthmatics antihysterics, or anthysterics, &c medicines against asthma, hysterics, &c

ANTIACID a (from αντι and *acidus*, sour) Contrary to sourness, alkaline (*Arbuthnot*)

ANTIADES (from αντιαω *to meet against, or oppose*) The tonsils, from their antagonist position to each other

ANTIBACCHIUS, in ancient poetry, a foot consisting of three syllables, the two first long, and the last short, such is the word ambīrĕ

ANTICARDIUM (from αντι, *against*, or *opposite*, and καρδιον, *the heart*) The hollow at the bottom of the breast the pit of the stomach

ANTICHAMBER See ANTECHAMBER

ANTICHORUS In botany, a genus of the class and order octandria monogynia Calyx four leaved petals four, capsule superior, subulate, four-celled, four valved, seeds numerous The only known species is a native of Africa

ANTICHRESIS (from αντι and χρησις, from χραομαι, *I use*) In the civil law a covenant, or convention, whereby a person borrowing money of another engages or makes over his lands or goods to the creditor, with the use and occupation thereof, for the interest of the money lent This covenant was allowed of by the Romans, among whom usury was prohibited it was afterwards called mort gage, to distinguish it from a simple engagement, where the fruits of the ground were not alienated, which was called vif gage

ANTICHRIST, in a general sense, denotes an adversary of Christ, or one who denies that the Messiah is come The word is compounded of αντι contra, against, and Χριστος Christ In this sense, Jews, Infidels, &c may be said to be Antichrists

ANTICHRIST is more particularly used for a tyrant who is to reign on earth, toward the end of the world, to make the ultimate proof of the elect, and to give a shining instance of the Divine vengeance, before the last judgment

The Bible and the fathers all speak of antichrist as a single man, though they assure, withal, that he is to have divers precursors, or fore-runners Yet many protestant writers apply to the Romish church, and the pope, who is at the head of it, the several marks and signatures of antichrist enumerated in the Apocalypse, which would rather imply antichrist to be a corrupt society, or a long series of persecuting pontiffs, than a single person Or rather, a certain power or government, that may be held for many generations, by a number of individuals succeeding one another The antichrist mentioned by the apostle John, 1 Ep ii 18 and more particularly described in the book of Revelations, seems evidently to be the same with the Man of Sin, &c characterised by St. Paul in his Second Epistle to the

Thessalonians, ch ii And the whole description literally applies to the excesses of papal power Had the right of private judgment, says an excellent writer, been always adopted and maintained, antichrist could never have been, and when the sacred right comes to be universally asserted, and men follow the voice of their own reason and consciences, antichrist can be no more

However the point having been maturely debated at the council of Gap, held in 1603, a resolution was taken thereupon, to insert an article in the confession of faith, whereby the pope is formally declared to be antichrist — Pope Clement VIII was stung to the life with this decision, and even king Henry IV of France, was not a little mortified, to be thus declared, as he said, an imp of antichrist

For an interesting account of the various opinions on this subject, see bishop Newton on the Prophecies, Disserta 22 See also Kett on Prophecy

ANTICHRI'STIAN *a* (from αντι and χριστιανος) Opposite to christianity (*South*)

ANTICHRI'STIANISM *s* (from *antichristian*) Opposition or contrariety to Christianity (*Decay of Piety*)

ANTICHRISTIA'NITY *s* (from *antichristian*) Contrariety to Christianity

ANTICHTHON in the Pythagorean philosophy, denoted a globe similar to the earth, and like it supposed to move round the sun, but invisible to us, because always on the opposite side of the luminary This feigned body made up the desired number of ten spheres

ANTICHTHONES, was used by ancient geographical writers in two senses 1 To denote those inhabitants of the earth which we now call antipodes 2 To denote the inhabitants of contrary hemispheres

To ANTI'CIPATE *v a* (*anticipo*, Lat) 1 To take something sooner than another, to take first possession (*Hammond*) 2 To take up before the time (*Dryden*) 3 To foretaste or take an impression of something, which is not yet, as if it really was (*Denham*) 4 To preclude (*Shakspeare*)

ANTICIPA'TION *s* (from *anticipate*) 1 The act of taking up something before its time (*Holder*) 2 Foretaste (*L'Estrange*) 3 Opinion implanted before the reasons of that opinion can be known (*Derham*)

Anticipation, in music, is when a diminutive note lies between two other notes, and was invented with a view to vary the melody without altering the intention when it is made with a beat or a shake and swelling the sound, it will have greater effect

A'NTICK *a* (*antiquus*, ancient) Odd, ridiculously wild (*Dryden*)

A'ntick *s* 1 He that plays anticks, or uses odd gesticulation, a buffoon (*Shakspeare*) 2 Odd appearance (*Spenser*)

To A'ntick *v a* (from *antick*) To make antick (*Shakspeare*)

A'NTICKLY *ad* (from *antick*) With odd postures (*Shakspeare*)

ANTICLIMAX (from αντι and κλιμαξ, *gradation*) In rhetoric, is a figure whereby the progress of a discourse descends from great to little, and this is sometimes rendered peculiarly agreeable by such a concord between the sense and sound as may contribute to make diminutions appear still more diminutive Horace affords a striking example Parturiunt montes, nascitur ridiculus mus

ANTICOLICA, in the Materia Medica, medicines suited to cure the colic

ANTICONVU'LSIVE *a* (from αντι and *convulsive*) Good against convulsions (*Floyer*)

A'NTI-COR (from *anti*, in opposition to, and *cor*, the heart) A disease in horses, formerly supposed to reside in the heart itself, or the pericardium It is now, however, fully ascertained to be an inflammatory quinsy, or angina and should of course be attacked by purgatives, clysters, bleeding, and blisters, or stimulating cataplasms applied to the throat

ANTICOSTI, an island in the mouth of the river St Laurence, North America Lat. 49 to 52 N Lon 64 16 W

ANTICO'URTIER *s* One who opposes the court

ANTICUM, in architecture, a porch before a door

ANTICUS Serratus minor See Serratus

Anticus (Peron us) See Peronæus

Anticus (Tibialis) See Tibialis

ANTIDACTYLUS, a name to a foot of poetry the reverse of a dactyl, consisting of three syllables the first two short, and the last long

ANTIDESMIA In botany, a genus of the class and order diœcia pentandria Calyx five-leaved, corolless male, anthers half-cloven Fem stigmas five, berry cylindric, one seeded Three species, all natives of China or the East Indies

ANTIDICOMARIANITES (from αντιδικος, *adversary*, and Μαρια, *Mary*) A sect of ancient Christians, who thought that the Holy Virgin did not preserve a perpetual virginity, but that she had several children by Joseph after our Saviour's birth

ANTIDORON, in ecclesiastical writers, a name given by the Greeks to the consecrated bread, out of which the middle part marked with the cross wherein the consecration resides, being taken away by the priest, the remainder is distributed after mass to the poor

ANTIDO'TAL *a* (from *antidote*) That has a power of counteracting poison (*Brown*)

ANTIDOSIS, in antiquity an exchange of estates, practised by the Greeks on certain occasions with peculiar ceremonies, and first instituted by Solon When a person was nominated to an office, the expence of which he was not able to support, he had recourse to the antidosis, that is, he was to seek some other citizen of better substance than himself, who was free from this and other offices, in which case the former was excused In case the person thus substituted denied himself to be richest, they were to exchange estates, after this manner the doors of their houses were close shut up and sealed, that nothing might

be conveyed away, then both took an oath to make a faithful discovery of all their effects, and within three days an exchange of estates took place

ANTIDOTE (*antidotus*, ἀντίδοτος, from ἀντι, *against*, and δίδωμι, *to give*) A remedy A medicine which possesses the property of expelling the mischiefs of another, as of poison

ANTIFEBRILL *a* (ἀντι and *febris*) Good against fevers (*Floyer*)

ANTIGONE a daughter of Œdipus, king of Thebes, by his mother Jocasta She buried by night her brother Polynices, against the positive orders of Creon who, when he heard of it, ordered her to be buried alive She however killed herself before the sentence was executed, and Hæmon the king's son, who was passionately fond of her, and had not been able to obtain her pardon, killed himself on her grave The death of Antigone is the subject of one of the tragedies of Sophocles The Athenians were so pleased with it at the first representation, that they presented the author with the government of Samos This tragedy was represented thirty-two times at Athens without interruption *Sophocles*

ANTIGRAPHE, in antiquity, a law suit about kindred

ANTIGRAPHUS in antiquity, has various meanings 1 An officer of Athens who kept a check on the chief treasurer's account 2 In middle age writers, a secretary, or chancellor 3 An abbreviator of the papal letters 4 A character used to denote a diversity of sense in translations

ANTIGUA See ANTEGA

ANTIGUGITER See SIPHON

ANTILEGOMENA, in Scripture criticism, an expression denoting doubtful but acknowledged by most to be genuine, one of the three classes into which Eusebius has distributed the books of the New Testament the other are homologoumena, i e of undoubted authority, and nothi or spurious

ANTILLES, the French name for the Caribbees

ANTILOBIUM (from ἀντι and λοβος, *the lottom of the ear*) The tragus, or that part of the ear which is opposite the lobe

ANTILOGARITHM, the complement of the logarithm of a sine, tangent, secant, &c to that of the radius This is found by beginning at the left hand subtracting each figure from 9, and the last figure from 10

ANTILOGY, in matters of literature, an inconsistency between two or more passages of the same book

ANTILOPE, in zoology See ANTELOPE

ANTILUTHERANS a sect or party among the ancient reformers, who maintained opinions, chiefly in relation to the eucharist, different from those of Luther

ANTILYSSUS (*antilyssus*, ἀντιλυσσος, from ἀντι, *against*, and λυσσα, *the madness caused by the bite of a mad dog*) Medicines against the bite of a mad dog

ANTIMENSIUM, a consecrated table-cloth, sometimes used in the Greek church where there is no altar Sometimes this name is given to a portable altar

ANTIMENSIUS, an officer in the ancient Greek church who placed the communicants in proper order

ANTIMERIA, in grammar, a figure whereby one part of speech is used for another e g velle suum cuique est, for voluntas sua cuique est, also, populus late rex, for populus late regnans

Antimeria, in a more restrained sense is a figure where the noun is repeated instead of the pronoun

ANTIMETABOLE in rhetoric a figure which sets two things in opposition to each other The word is compounded of ἀντι *against* and μεταβολη, from μεταβαλλω, I shift or transfer, i e a shifting or setting two things over against each other This figure is twice exemplified in an apophthegm of Musonius which on account of its excellence, is called aureum monitum, the golden maxim or precept

Αν τι πραξῃς καλον μετα πονου, ὁ μεν πονος οιχεται το δε καλον μενει

Αν τι ποιησῃς αισχρον μετα ἡδονης, το μεν ἡδυ οιχεται, το δε αισχρον μενει

In English thus

"Allowing the performance of an honourable action to be attended with labour the labour is soon over, but the honour immortal whereas should even pleasure wait on the commission of what is dishonourable the pleasure is soon gone, but the dishonour eternal

ANTIMETATHESIS in rhetoric, is the inversion of the parts or members of an antithesis

ANTIMETER, or REFLECTING SECTOR, an instrument invented by Mr Garrard calculated for measuring small angles with greater accuracy than by the sextant or other instruments commonly used

The frame of it is similar to that of Hadley's quadrant, having two radii, a limb and braces but with this difference, that the further radius is produced upwards of four inches beyond the centre of motion of the index, and the great speculum, or what is called the index-glass in Hadley's quadrant, being placed there is called the upper centre In this instrument there is no provision for the back observation

ANTIMISIUM, in antiquity, a table placed before the Roman tribunal, or judgment-seat

ANTIMONA'RCHICAL *a* (ἀντι and μοναρχια) Against government by a single person (*Addison*)

ANTIMO'NIAL *a* (from *antimony*) Made of antimony (*Blackmore*)

ANTIMO'NIUM (*antimonium*, ἀντιμονιον The origin of this word is very obscure The most received etymology is from ἀντι, *against*, and μονος, *a monk*, because Valentine, by an injudicious administration of it, poisoned his brother monks) See STIBIUM, and ANTIMONY

ANTIMONIUM CALCINATUM Calx an-

timonii Antimonium diaphoreticum This preparation of antimony, termed oxydum stibii album, in the new chemical nomenclature, is greatly fallen into disuse Its virtues are diaphoretic and alterative

ANTIMONIUM MURIATUM Butyrum antimonii Causticum antimoniale Butter of antimony This preparation of antimony, called in the new chemical nomenclature murias stibii hyperoxygenatum, is employed to destroy warts, carcinomatous excrescences, staphyloma, &c

ANTIMO'NIUM TARTARISATUM Tartarus emeticus Tartarus antimonialis Tartar emetic, given in small doses, is nauseating, cathartic sudorific, deobstruent, and antispasmodic promoting absorption Internally it is exhibited in bilious fevers, foulness of the stomach retrocedent and atonic exanthemata, abdominal physconia tumour of the testicle, paralysis, amaurosis, pituitous diseases of the lungs rheumatism, and comatose diseases When given in very small doses, so as to create nausea it is recommended in tabes, luxation and incarcerated hernia Externally in the form of powder or dissolved in water, it is applied by a pencil to warts and obstinate ulcers it is also given in the form of clyster, with a view to produce irritation in soporose diseases apoplexy, ileus and hernia incarcerata The powder mixed with saliva, and rubbed on the scrobiculus cordis, excites vomiting The best antidote against the bad effects of too large a quantity of this and other antimonial preparations, is a decoction of the bark of cinchona

ANTIMO'NIUM VITRIFACTUM Glass of antimony See ANTIMONY

ANTIMONY a metallic substance of a greyish white colour, considerable brilliancy, and strongly resembling tin, or silver Its texture is laminated, and the laminæ appear arranged one over another and crossing in every direction its surface often exhibits a kind of crystals in the form of stars or fern leaves It is very brittle, and easily pulverized, melts, when heated just to redness, at about 810 deg Fahrenheit, evaporates, if the heat be increased, communicates to the fingers a peculiar taste and smell when rubbed upon them Its specific gravity varies from 6 702 to 6 86 The substance to which this name has been commonly, though erroneously, applied, is a mineral, or ore of antimony, composed of a mixture of sulphur with that metal, and it is accordingly, in the language of modern chemistry, denominated sulphuret of antimony Some account of its properties as distinguished from the metal, will be found in the next article The pure metal, of which we are now treating, was called regulus of antimony

Of the ores from which antimony is extracted, there are various kinds, composed chiefly of that metal and sulphur in different proportions, occasionally mixed with other metals, as lead and iron, and sometimes with arsenic, beside the usual stony or earthy matters which form the gangue, or matrix of the ore In the examination of ores which are suspected to contain antimony, its presence is detected either by the blow-pipe on charcoal, when they exhale a dense smoke of a white or yellowish colour, and deposit yellowish flowers, or white needleform crystals on the surface of the charcoal, or more certainly, by reducing 200 grains of the ore to fine powder, and digesting it slowly for an hour in a moderately diluted nitro muriatic acid, in which the nitrous is not more than one-third of the muriatic part, the clear liquor is then to be decanted, evaporated to about half its bulk, and poured into a large quantity of distilled water, when, if the metal be present, a copious white precipitate of its oxyd immediately takes place If this oxyd be edulcorated and mixed with an equal weight of crude tartar and put into a small lined crucible fitted with a cover, a moderate red heat will reduce it to a metallic button

The only ore of antimony which is found in sufficient abundance for the purpose of manufacture is the grey or sulphurated, and this is easily reduced After picking out the larger pieces of the gangue the remainder is coarsely bruised, and put into crucibles having small holes in their bottom, and inserted into other crucibles, or connected with them by means of pipes These are arranged in furnaces on stages rising one above another like stairs As the mass fuses very readily, a low red heat is at first applied, and the sulphurated metal descends through the hole into the lower crucibles, leaving the impurities behind A more simple and economical practice has been established in Hungary and France instead of employing separate crucibles, the whole mass of ore is melted together in a reverberatory furnace the surface of the metal being kept covered with charcoal to prevent oxydation, and when in a state of fusion, is drawn off into the receptacle by the removal of a plug The substance obtained by these methods is not pure metal but sulphuret of antimony, and being remelted and cast into loaves or cakes forms the common or crude antimony of commerce

It is from the sulphurated ore, reduced as above, that the pure antimony is obtained, either by roasting by scorification, or by what is called dry parting or precipitation

In the first method, the sulphuret is pulverized, and spread thinly on the floor of a reverberating furnace or muffle, to be freed from its sulphur The degree of heat necessary for this purpose is not very great, and is indicated by the fumes of sulphur becoming visible in the form of a lambent blue flame By a continuance and occasional increase of the heat, an ash-grey oxyd of antimony is obtained, which being mixed with half its weight of crude tartar, and exposed in a covered crucible to a full red heat, yields, if the process be carefully managed, nearly three fourths its weight of pure antimony

The second method, on account of its expedition, is generally preferred in the laboratory,

though it be more expensive and less accurate than the former It consists, usually, in mixing four parts of crude antimony finely powdered, with three parts of tartar, and one and a half of nitre, and projecting the mixture by spoonsful into a red hot crucible, till it be nearly filled, being then covered, and a full red heat applied for half an hour, the contents are either poured out into a greased iron cone, or suffered to cool in the crucible, by which means the metal, covered with a mass of saline scoriæ, is reduced to a state of purity

In the third method, the reduction is effected by fusing the sulphuret with any other metal whose affinity for sulphur is greater than that of antimony, in which case the sulphur combines with the added metal, and the antimony is precipitated in a button There are several metals fitted for this purpose, but the only one now employed is iron, and the metal obtained by its use has been called martial regulus of antimony Horse-shoe nails are generally used, because the iron of which they are made is of the kind most proper to combine with the sulphur, and to separate it from the antimony This method will not, like the two former, afford the metal in a state of absolute purity, as a small quantity of the iron remains in combination with it

Antimony, on exposure to the air, suffers no change except the loss of its lustre neither is it altered by being kept under water, but when it is made red hot, and steam passed over it, it is decomposed with a violent detonation

This, like most of the other metals, combines with oxygen in two different proportions, thereby forming two oxides of antimony The first is obtained by dissolving the metal in muriatic acid, and diluting the solution with water, the precipitate which takes place is the oxide united with a little muriatic acid, which is separated from it by washing and then boiling for some time in a solution of carbonat of potash The second is produced by exposing the antimony in the open air to a violent heat on its taking fire, a white oxide is sublimed, formerly called argentine flower of antimony It is obtained also by causing nitric acid to act upon the metal, and by throwing it into red hot nitre the potash which remains combined with the oxide is separated, by adding water to the compound which dissolves a part of it, and on the addition of an acid the oxide is precipitated in the form of a white powder The oxide obtained by nitric acid has been called diaphoretic, or white powder of antimony, that by muriatic acid, Algaroth's powder, and that by sublimation silver, or argentine flowers, as above

All the acids, except the carbonic, dissolve the grey or imperfect oxide of this metal, the formation of which will be noticed in the next article by combining with it acid of tartar, the well known salt is produced, anciently called emetic tartar, but now antimoniated tartrite of potash

The sulphuric acid, by boiling on pure antimony, is partly decomposed Sulphureous gas is first separated, and sulphur itself sublimes towards the end, an oxide is formed, as well as a small quantity of sulphat of antimony, which is very deliquescent, and easily decomposed

It decomposes the nitric acid with great facility, part of the antimony is oxidated, forming the bezoar mineral, and a portion is dissolved, forming a nitrat of antimony, decomposable by heat, a[illegible]nt

The muriatic acid acts on it only by a long digestion The nitro-muriatic acid is its most convenient solvent The solution has no colour The oxy-muriatic acid possesses most equal powers thus, two parts of the corrosive muriat of mercury and one of antimony being distilled together, a slight degree of heat drives over a butyraceous matter, the sublimed muriat of antimony, or butter of antimony, the acid, as in the corrosive muriat of mercury, being in an oxygenated state The sublimed muriat of antimony becomes fluid by a very gentle heat and is thus easily poured from one vessel to one another

Diluted with water, a white oxide of antimony falls which is powder of Algaroth, or mercurius vitæ Wine and the acetous acid dissolve it

Antimony unites with sulphur very readily by fusion, forming a sulphuret of antimony similar in its properties to the crude antimony obtained by smelting the several grey antimonial ores it combines also with phosphorus, forming phosphuret of antimony

Anciently this substance was employed chiefly, if not entirely in the composition of paint with which the ladies blackened their eye brows, and it is several times mentioned in Scripture as such Jezebel, understanding that Jehu was to enter Samaria, is represented to have painted her eyes, or as the Hebrew signifies "put her eyes in antimony At this day the women of Syria, Arabia, and Babylonia, anoint and blacken themselves about the eyes, and both men and women put black upon their eyes in the Desert, to preserve them from the heat of the sun, and the piercing of rays

This metal is capable of uniting, and thereby of forming alloys, with several of the other metals, but the greater part of these alloys have not been applied to any use With gold it may be combined by fusion, forming a brittle compound of a yellow colour, and upon this facility of combination a method has been founded, first by Basil Valentine, of refining gold by antimony With platinum it unites easily, and the alloy is much lighter than platinum With silver it combines readily by fusion, as it does with copper, iron, tin, lead, nickel, zinc, and bismuth The alloy of antimony with copper is of a beautiful violet colour, that with tin is used for several purposes in the arts, particularly for making the plates on which music is engraved, that with lead is employed for making printers types The proportion of the metals is about four parts of lead to one of antimony, either

with or without zinc or bismuth. Antimony does not amalgamate with mercury while cold; but when three parts of the latter are mixed with one of melted antimony, a soft amalgam is produced, which very soon decomposes of itself. Other properties of antimony, in its several combinations, will be seen in the next article.

These are the principal properties of this semimetal, but as its ore, sulphur of antimony, is commonly used in a great number of pharmaceutic preparations, it may not be amiss to remind the reader of this particular. Beaten in a mortar to a powder, and levigated, with the addition of a little water, upon a hard and polished, but not calcareous stone, into as fine a dust as possible, and then dried, it forms the antimonium præparatum, or sulphuretum stibii nigrum, powdered, and burnt in an earthen vessel, until it no longer emits a sulphureous smoke, and then put into a covered crucible, and exposed to a strong heat, it melts, and forms the antimonium vitrifactum. Powdered and mixed with nitre, in the proportion of eight ounces to two pounds, and cast by degrees into a red hot crucible, and burnt for about half an hour, it affords the antimonium calcinatum, or oxydum stibii album. Similar to this preparation is the celebrated James's powder, as a substitute for which the London College have ordered the pulvis antimonialis (phosphas calcis stibiatus) made by throwing into a red hot pot an equal quantity of crude sulphur of antimony and hartshorn shavings, and agitating it until they become of an ash colour. The matter is then to be put into a crucible with another inverted upon it, and kept in a red heat for two hours. It is then to cool, and be reduced to a fine powder. The crocus of antimony is prepared by mixing a pound of powdered antimony and nitre, and one ounce of sea salt, by degrees, into a red hot crucible, and melting them with an augmented heat, and when cold separating the scoriæ. If one pound of vitriolic acid be poured into a retort, and a mixture of one pound of this crocus of antimony, with two pounds of dry sea salt, be added by degrees thereto, and distilled in the same bath, the product is the murias stibii hyperoxygenatus, called antimonium muriatum, or butter of antimony, in the Lond. Pharm. The antimonium tartarisatum, or tartarised antimony, tartris potassæ acidulus stibiatus, is made by boiling for about a quarter of an hour, a mixture of one pound and a half of the crocus with two pounds of crystals of tartar, and two gallons of water. The liquor is then to be filtred, and the strained liquor set by to crystalize. Besides these preparations there are the wine of antimony, and the tartarised wine. The former is made by digesting one ounce of powdered vitrified antimony with a pint and a half of Spanish white wine, the latter by dissolving two scruples of the tartarised antimony in two ounces of boiling water, and then adding eight ounces of Spanish white wine. With regard to the use of antimony in medicine, it is very considerable, though not so general as in former times. Calcined antimony is esteemed as an alterative and diaphoretic. Muriated antimony is employed by surgeons as a very powerful caustic for destroying warts and fungous flesh, and especially venereal excrescences. The prepared antimony is alterative and diaphoretic in small doses. Antimonium tartarisatum is used in common as a vomit in the dose of from one to four grains. Dissolved in water, and given with or without nitre, in the dose of an eighth of a grain every four hours, it cures inflammatory affections, as synocha, pleuritis, &c. acting as a very powerful diaphoretic. In pneumonia it is exhibited in nauseating doses as an expectorant. The vitrified antimony is emetic in the dose of from a quarter of a grain to a grain and a half. Pulvis antimonialis, supposed to be the same as James's powder, is given as a febrifuge in the dose of from three to five grains, and is a powerful diaphoretic. Antimonial wine in small doses, gut. xx. to xxx. is a febrifuge, diaphoretic, and alterative. ʒiij to ℥ss proves a useful emetic in hooping cough, &c. The tartarised antimonial wine is also emetic, ʒij to ʒiv, and a good febrifuge and diaphoretic in doses of from fifteen to forty drops.

Antimony (Sulphuret of), a substance composed of antimony and sulphur united, though it is commonly found native in the several ores of antimony. It is frequently known by the name of crude antimony, and was formerly called antimony, while the pure metal, in distinction from it, was termed regulus of antimony. See the last article. It is a mineral substance, of a darkish, or lead colour, full of long, shining, and needle-like striæ, and considerably heavy. It may be prepared artificially, by melting in a low red heat, a pound of pulverized antimony with eighteen ounces of sulphur, a uniform mass is produced weighing about two pounds, and possessing all the properties of native sulphuret.

Crude antimony, coarsely powdered, and exposed in a shallow vessel to a slow heat, gradually loses its sulphur, and by imbibing oxygen from the atmosphere, is converted into a grey or imperfect oxide. Much care is necessary in this process: the powder should be diligently stirred with an earthen rod, and if any part of it concretes on account of too strong a heat, it ought to be taken out and powdered afresh before the roasting is continued. This oxide, if well prepared, and heated to redness in a crucible, is fused into a transparent glass, possessing, according to circumstances, every shade of colour from light yellow to the deepest hyacinthine red: this is the glass of antimony, or in modern language, vitreous sulphurated oxide of antimony, which, on being blended with wax, forms the cerated glass. If the glass happen to be opaque, and of a darkish colour, it is called liver of antimony, which name is also applied to a preparation of crude antimony and nitre.

In the second method mentioned in the pre-

ceding article, of separating the pure metal from the crude antimony, it was stated that saline scoriæ covered the metal when precipitated, these scoriæ, on being dissolved in water, let fall a brown precipitate, or sulphurated oxide of antimony, long known by the name of kermes mineral. If an acid be added, the precipitate is of a fainter, and at length of an orange colour, this last precipitate is the sulphurated oxide of antimony, but contains a larger proportion of sulphur than the former, and has obtained the name of golden sulphur of antimony. See STIBIUM.

ANTINOEIA, in antiquity, annual sacrifices, and quinquennial games, in memory of Antinous the Bithynian.

ANTINOMIANS, in church history, denote those who maintain the law of no use or obligation under the gospel dispensation, or who hold doctrines that clearly supersede the necessity of good works and a virtuous life. The antinomians took their origin from John Agricola about the year 1538, who taught that the law is no ways necessary under the gospel, that good works do not promote our salvation, nor ill ones hinder it, that repentance is not to be preached from the decalogue, but only from the gospel.

This sect sprung up in England during the protectorate of Oliver Cromwell, and extended their system of libertinism much farther than Agricola, the disciple of Luther. Some of their teachers expressly maintained that as the elect cannot fall from grace, nor forfeit the divine favour, the wicked actions they commit are not really sinful, nor are to be considered as instances of their violation of the divine law; and that consequently they have no occasion either to confess their sins, or to break them off by repentance. According to them, it is one of the essential and distinctive characters of the elect, that they cannot do any thing which is either displeasing to God or prohibited by the law.

ANTINOUS, in astronomy, a northern constellation, generally reckoned a part of aquila: the figure is that of a handsome youth. The stars in this constellation, arranged according to their magnitudes, are 0 0 5 2 7 20, in all 34.

ANTIOCH, formerly the metropolis of Syria, in Asiatic Turkey. The Turks have reduced this town almost to nothing, but its magnificent ruins still remain. This city stood on the river Orontes, about twenty miles from the place where it empties itself into the Mediterranean, being equally distant from Constantinople and Alexandria, in Egypt, that is, about 700 miles from each. Seleucus Nicator called it Antioch from his father's name, according to some, or from that of his son, according to others. He built sixteen other cities bearing the same name, of which one, situated in Pisidia, is probably that where the name of Christians was first given to the followers of Jesus Christ. But that situated on the Orontes by far eclipsed, not only all the others of this name, but all the cities built by Seleucus. Antigonus, not long before, had founded a city in that neighbourhood, which from his own name he had called Antigonia, and designed it for the capital of his empire, but it was razed to the ground by Seleucus, who employed the materials in building his metropolis, and also transplanted the inhabitants thither.

The city of Antioch was afterwards known by the name of Tetrapolis, being divided as it were into four cities, each of them being surrounded with its proper wall, besides a common one which inclosed them all. The first of these cities was built by Seleucus Nicator, as already mentioned, the second by those who flocked thither on its being made the capital of the Syro-Macedonian empire, the third by Seleucus Callinicus, and the fourth by Antiochus Epiphanes.—About four or five miles distant stood a place called Daphne, which was nevertheless reckoned a suburb of Antioch. Here Seleucus planted a grove, and in the middle of it built a temple which he consecrated to Apollo and Diana, making the whole an asylum. To this place the inhabitants of Antioch resorted for their pleasures and diversions, whereby it became at last so infamous that, "to live after the manner of Daphne," was used as a proverb to express the most voluptuous and dissolute way of living. Here Lucius Verus, the colleague of M. Aurelius, chose to take up his residence instead of marching against the Parthians, while his general Cassius forbid by proclamation any of his soldiers to enter or even come near the place. In short, so remarkable was Daphne of old, that the metropolis itself was distinguished by it, and called Antioch near Daphne. Lat. 36 17 N. Lon. 36 45 E.

ANTIOCHUS, a name common to eleven kings of Syria, the most celebrated of whom was Antiochus III. surnamed the Great, brother to Seleucus Ceraunus. He was defeated by Ptolemy Philopater at Raphia, after which he made war against Persia, and took Sardes. After the death of Philopater, he endeavoured to crush his infant son Epiphanes, but his guardians solicited the aid of the Romans, and Antiochus was compelled to resign his pretensions. He conquered the greatest part of Greece, of which some cities implored the aid of Rome, and Annibal, who had taken refuge at his court, encouraged him to make war against Rome. He was glad to find himself supported by the abilities of such a general; but his measures being dilatory, and not agreeable to the advice of Annibal, he was conquered and obliged to retire beyond mount Taurus, and pay a yearly fine of 2000 talents to the Romans. His revenues being unable to pay the fine, he attempted to plunder the temple of Belus in Susiana, which so incensed the inhabitants that they killed him with his followers 187 years before the Christian era, after he had reigned 36 years. In his character of king Antiochus was humane and liberal, the patron of learning, and the friend of merit, and he published an edict, ordering his subjects never

to obey except his commands were consistent with the laws of the country He had three sons, Seleucus Philopater, Antiochus Epiphanes, and Demetrius The first succeeded him, and the two others were kept as hostages by the Romans Just Liv —They were all distinguished by the following surnames, Soter, Theos, The Great, Epiphanes, or illustrious, Eutheus, or noble, Sidetes Grypus, Cyzonicus, Pius and Asiaticus This last being deposed by Pompey the Great, B C 65, Syria became a Roman province, and the race of Antiochus was extinguished

ANTIOCHUS EPIPHANES, or the Illustrious usurped the throne of Syria from his nephew Demetrius, 175 years before Christ, and attempted to take Egypt from his nephew Ptolemy Philometer but was repulsed He deposed Onias, the high-priest of the Jews, and besieged and took Jerusalem, 170 years before Christ, when he profaned the temple of God offered sacrifices in it to Jupiter Olympius carried away the sacred vessels, and committed the most horrid acts of cruelty At his return to Antioch, 167 years before Christ, he put to death the seven brothers the Maccabees, with old Eleazar However, Matthias and Judas Maccabeus defeated his armies, and he himself was routed by the Elymeans, and obliged to return to Babylon, where he was seized with a dreadful disease, and died in the greatest inward agony, 164 years before the Christian æra

ANTIPÆDOBAPTISTS, from ἀντι, *against*, παι παιδος, *child*, and βαπτιζω, *baptize*, whence βαπτισμα, is a distinguishing denomination given to those who object to the baptism of infants because they say infants are incapable of being instructed, and of making that profession of faith which intitles them to this ordinance and an admission into the church communion See ANABAPTISTS and BAPTISTS

ANTIPARALLELS, in geometry, are those lines which make equal angles with two other lines, but contrary ways, that is calling the former pair the first and second lines and the latter pair the third and fourth lines, if the angle made by the first and third lines be equal to the angle made by the second and fourth, and contrariwise the angle made by the first and fourth equal to the angle made by the second and third, then each pair of lines are antiparallels with respect to each other, viz the first and second, and the third and fourth So if AB and AC be any two lines, and FC and FE be two others, cutting them so, (pl 13 fig 3)

that the angle B is equal to the angle E,

and the angle C is equal to the angle D,

then BC and DE are antiparallels with respect to AB and AC, also these latter are antiparallels with regard to the two former It has been commonly asserted that each pair of antiparallels cuts the other into proportional segments, taking them alternately, but this is erroneous, for although

AB AC AE AD, and
FE FC FB FD, yet we cannot consistently with truth, say

AB AC AE AD DB EC
and FE FC FB FE DE BC for

the last proportions will appear to every one who examines them closely, to be absurd and contradictory Instead, then of the analogies which have been commonly given as applicable to antiparallels, we present the following, which are both curious and accurate

AD^2 $AC^2—AD$ $AD^2—AE^2$ $EC^2—DB^2$
FD $FC^2—FD^2$ $FD^2—FB^2$ $BC^2—DE^2$

ANTIPARALYTICK *a* (ἀντὶ and παραλυσι) Efficacious against the palsy

ANTIPARASTASIS, from ἀντι and παραστασις of παριστημι *I exhibit*, in rhetoric, a reply made to an opponent, by allowing part of his argument and denying the rest

ANTIPAROS one of the Greek islands in the Archipelago, about sixteen miles in circumference In it is a remarkable grotto, much admired and spoken of by travellers, and by some produced in evidence of the vegetation of stones It takes its name from its situation opposite Paros, from which it is only about four miles to the west

ANTIPATER, son of Iolaus, was a soldier under Philip, and raised to the rank of general under Alexander of Macedon He was a pupil of Aristotle, and the faithful minister of Philip and Alexander The former monarch once coming late to the levee, said, "I have slept sound this morning, but then I knew Antipater was waking" A person observing to Alexander that all his officers of state wore purple except this prime minister "Yes (answered he), but Antipater is all purple within While Alexander was abroad, he left Antipater in the government of Macedon, and by his prudent management he kept all Greece in order On the death of his master, in the general distribution of his territories, Antipater obtained the European provinces Not long after, the confederate states of Greece attacked him, but by his address and vigilance they were defeated, and he marched to Athens, which he took, and destroyed its democratic government He did the same by the other states, on which he was called the father of Greece His last advice to Polysperchon, whom he had chosen for his successor, was, "never to admit a woman to meddle in state affairs He died B C 318, aged 80

ANTIPATHES In zoology, a genus of the class and order vermes, zoophyta Animal plant-form, stem expanded at the base, internally horny beset with small spines, externally covered with a gelatinous flesh beset with numerous polype-bearing tubercles Fourteen species, chiefly inhabitants of the Indian and Mediterranean seas

ANTIPATHETICAL *a* (from *antipathy*) Having a natural contrariety to any thing (*Howel*)

ANTIPATHY *s* (from ἀντ and παθος, *antipathie*, Fr) A natural contrariety to any

thing, so as to shun it involuntarily: opposed to sympathy (*Locke*).

ANTIPATHY is reckoned by many, a natural horror and detestation, an insuperable hatred, an involuntary aversion, which a sensitive being feels for some other object, whatever it is, though the person who feels this abhorrence is entirely ignorant of its cause, and can by no means account for it. Such is the invincible aversion of particular persons against cats, mice, spiders, &c., a prepossession which is sometimes so violent, as to make them faint at the sight of these animals. Of the most common and natural antipathies the ancient naturalists, the schoolmen, and the vulgar, form so many legends, and relate them as certain facts.

M. C. G. Lehmann, in his observations on the manner in which the spider spins its web, speaking of this antipathy, says: 'It is of importance to consider by what means that aversion commonly called natural, and which is merely the result of improper education, can be overcome. Rosel accustomed himself to view these insects first at a distance. He then considered their webs, and at last looked at the insects themselves through a microscope. Goze first viewed individual parts of spiders, such as the legs, head, &c. till he was at length able to look without any sentiment of aversion at the entire insect. Both these naturalists, by long habit, so far overcame this aversion, that they could handle and examine spiders with the same indifference as others can flies.'

ANTIPELARGIA, an ancient law, which obliged children to furnish necessaries for their aged parents. In some Latin writers, this is rendered, very appositely, Lex ciconiaria, or the stork's law.

ANTIPERISTALTIC, in anatomy, a motion of the intestines contrary to the peristaltic motion. The word is derived from αντι, *against*, περι, *about*, and σταλτικ@, *that which hath the power of compressing*.

ANTIPERISTASIS, s. (αντι and περιϛαμαι.) The opposition of a contrary quality by which the quality it opposes becomes heightened or intended (*Cowley*).

ANTIPESTILENTIAL, a. (αντι and *pestilential*.) Efficacious against the plague (*Har.*).

ANTIPHERNA, a Greek term, whose meaning nearly corresponds with that of jointure.

ANTIPHLOGISTIC, (αντιφλογιστικα, from αντι, *against*, and φλεγω, *to burn or inflame*,) in medicine, a term applied to those medicines, plans of diet, and other circumstances, which tend to oppose inflammation, or which, in other words, weaken the system by diminishing the activity of the vital power.

ANTIPHLOGISTIC THEORY, in chemistry, the theory which accounts for the phenomena of chemistry without the assistance of phlogiston. It is so called in opposition to the theory of Stahl, which explained every thing by means of phlogiston, and is therefore called the phlogistic theory. See the word.

According to the theory last mentioned, phlogiston, or the principle of inflammability, was considered as necessarily belonging to all combustible bodies, and the separation of it as the cause of their combustion. The eminent talents of the founder of this theory, the number of valuable facts which he discovered, and the ingenuity of his experiments, contributed to obtain for it a very universal reception among chemists, by whom it was long and exclusively regarded with admiration and applause. During all this time, however, nobody could tell what phlogiston was—and no proof of its existence was afforded, except the impossibility of explaining the burning of bodies without it. The doctrine was even found to involve this absurdity,—that in the combustion, or as it was called the calcination, of metals, those substances became heavier by the loss of their phlogiston, and as this was observable also in the combustion of sulphur which yielded an acid of greater weight than the quantity of sulphur consumed—the followers of Stahl who refined upon his theory and adhered to their opinions with obstinacy, were reduced to the necessity of assigning to their favourite phlogiston a principle of levity, imagining that being lighter than nothing, its separation from another body would leave that body heavier than before. But this subterfuge would by no means clear the difficulty, nor remove suspicion from the theory it was urged to support. Accordingly philosophers became dissatisfied with it, and, after many alterations, modifications and improvements, it was finally abandoned in favour of the opposite theory, which explains combustion and various other phenomena of chemistry, by the absorption of oxygen, (instead of the loss of phlogiston,) and ascribes to the addition of this principle the increase of weight which metals, and various other bodies, acquire by combustion. The author of this theory was the illustrious, but unfortunate, Lavoisier, who, availing himself of many preceding discoveries of others, adding to them the results of his own accurate and brilliant experiments, and combining the whole in his vigorous and discriminating mind, has rendered to chemistry a most essential service, and acquired for his own name a celebrity which will last as long as the science to which his labours, his fortune, and his talents were dedicated. For some years he stood alone in defence of his opinions, but he was afterwards joined by Berthollet, Fourcroy, and Morveau, in France, then by Kirwan, and others in England; and by most of the chemists on the continent. His theory, which is frequently distinguished by his name, is now adopted, at least in the most prominent parts of it, by almost all the philosophers and chemists in the world, Dr. Priestley being the last person of any note who persisted in his opposition to it.

As it would be improper to state further particulars on this subject here, we are under the necessity of referring to the articles CHEMISTRY, COMBUSTION, LAVOISIER, OXYGEN, PHLOGISTON, and WATER.

ANTIPHONARY, antiphonarium, a service book which contained all the invitatories, responsories, collects, and whatever else was sung or said in the choir, except the lessons. This is otherwise called responsarium, from the responses therein contained. The author of the Roman antiphonary was pope Gregory the Great.

ANTIPHONY, a term in music, used by the ancient Greeks, in opposition to Homophony, which implied a performance wholly in unison. Antiphony also signified certain symphonies performed by various voices, or instruments, in octaves and fifteenths to each other; but was more particularly applied to the practice of singing anthems and hymns alternately or in dialogue. The present signification of the word antiphony only applies to certain short passages occasionally drawn from scripture, and allusive to the particular feast or celebration of the day.

ANTIPHRASIS, a sort of figurative expression, which has a contrary meaning to what it carries in appearance. Or, a kind of irony, wherein we say one thing, and mean the contrary. The word is derived from αντι, and φρασις of φραζω *I speak*. Sanctius defines antiphrasis to be a form of irony whereby we say a thing, by denying what we ought rather to affirm it to be: as when we say, it did not displease me; or, he is no fool; meaning, I was pleased with it; or, he is a man of sense. —On this principle, the antiphrasis ought to be ranked among the figures of sentences, and not among those of words.

ANTIPODAL. *a.* (from *antipodes*.) Relating to the antipodes (*Brown*).

ANTIPODES, in geography, are the inhabitants of two places on the earth which lie diametrically opposite to each other, or that walk feet to feet: that is, if a line be continued down from our feet quite through the centre of the earth, till it arrive at the surface on the other side, it will fall on the feet of our Antipodes; and vice versa.——Antipodes are 180 degrees distant from each other every way on the surface of the globe; they have equal latitudes, the one north and the other south; but they differ by 180 degrees of longitude: they have therefore the same climates or nearly the same degrees of heat and cold, with the same seasons and length of days and nights; but all of these at contrary times; it being day to the one when it is night to the other, summer to the one when it is winter to the other, &c.

A'NTIPOPE. *s.* (from αντι and *pope*.) He that usurps the popedom (*Addison*).

ANTI-PORTICO, in architecture, a vestibule.

ANTIPROBABILISM, the doctrine or system of those who hold it unlawful to follow the less probable opinion, in opposition to the more probable one.

ANTIPROBOLE, in rhetoric, a figure whereby the defendant adopts or admits the charge brought against him by the prosecutor. E. gr. Supposing the prosecutor's προβολη to be, Titus has killed Caius; the defendant's antiprobole may be, I have killed him, but not designedly.

ANTIPROPEMPTICON, in poetry, a poem wherein a person going a journey addresses himself to his friends.

ANTIPTOSIS. *s.* (αντιπτωσις.) A figure in grammar, by which one case is put for another.

ANTIQUARE, among Roman lawyers, properly denotes the rejecting of a new law, or refusing to pass it; in which sense antiquating differs from abrogating.

ANTIQUARE is also used for a law's growing obsolete, or into disuse, either by age or non observance.

ANTIQUARII, a name given to copiers of old books. After the decline of learning amongst the Romans, and when many religious houses were erected, learning was chiefly in the hands of the clergy, the greatest number of whom were regulars, and lived in monasteries. In these houses were many industrious men who were continually employed in making new copies of old books, either for the use of the monastery, or for their own emolument. These writing monks were distinguished by the name of Antiquarii.

ANTIQUARIUM, in antiquity, an apartment in which their antique monuments were preserved.

ANTIQUARY, a person who studies and searches after monuments and remains of antiquity, as old medals, books, statues, and inscriptions; and, in general, all curious pieces that may afford any view into antiquity. In the chief cities of Greece and Italy, there were persons of distinction called antiquaries, whose business it was to show strangers the antiquities of the place, and explain the ancient inscriptions. Pausanias calls these antiquaries Εξηγηται. The Sicilians call them mystogogi. There was an ancient college of antiquaries erected in Ireland by Ollam Fodhla, 700 years before Christ, for composing a history of that country; and to this it is owing, that the history and antiquities of that kingdom may be traced back beyond those of most other nations. There is a society of antiquaries in London, and another in Edinburgh, incorporated by the king's charter.

ANTIQUARY is also used by ancient writers for the keeper of the antiquarium, or cabinet of antiquities. This officer is otherwise called archæota, or antiquary of a king, a prince, a state, or the like.

A'NTIQUARY. *a.* Old; antique (*Shaks.*).

To A'NTIQUATE. *v. a.* (*antiquo*, Lat.) To put out of use; to make obsolete (*Addison*).

A'NTIQUATEDNESS. *s.* (from *antiquated*.) The state of being antiquated.

ANTI'QUE. *a.* (*antique*, French.) 1. Ancient, old, not modern (*Shakspeare*). 2. Of genuine antiquity (*Prior*). 3. Of old fashion (*Smith*). 4. Odd, wild, antick (*Donne*).

ANTI'QUE. *s.* (from the *adj.*) An antiquity, a remain of ancient times (*Swift*).

ANTIQUE, is a term frequently used by sculptors, painters, and architects, to denote

such pieces of their different arts as were made by the ancient Greeks and Romans

ANTI'QUENESS s (from *antique*) The quality of being antique (*Addison*)

ANTIQUITIES, a term implying all testimonies, or authentic accounts that have come down to us of ancient nations Bacon calls antiquities the wrecks of history, or such particulars as industrious and learned persons have collected from genealogies, inscriptions, monuments, coins etymologies, archives, instruments, &c Antiquities include "an historical knowledge of the edifices magistrates, office, habiliments, manners, ceremonies, worship, and other objects worthy of curiosity, of all the principal ancient nations of the earth This science is not a matter of mere curiosity, but is indispensable to many as, the theologian, who ought to be thoroughly acquainted with the antiquities of the Jews, to enable him properly to explain numberless passages in the Old and New Testaments to the lawyer, who, without the knowledge of the antiquities of Greece and Rome, can never well understand and properly apply the greatest part of the Roman laws to the physician and the philosopher, that they may have a complete knowledge of the history and principles of the physic and philosophy of the ancients to the critic that he may be able to understand and interpret ancient authors to the orator and poet who will be thereby enabled to ornament their writings with numberless images, allusions, comparisons, &c

Antiquities are divided into sacred and profane, into public and private universal and particular &c It is true, that the antiquaries (especially such as are infected with a spirit of pedantry, and the number of these is great) frequently carry their inquiries too far and employ themselves in laborious researches after trifles, but the abuse of a science ought never to make us neglect the applying it to rational and useful purposes Many antiquaries also restrain their learned labours to the eclaircissement of the antiquities of Greece and Rome, but this field is far too confined, and by no means contains the whole of this science, seeing it properly includes the antiquities of the Jews, Egyptians, Persians, Phœnicians, Carthaginians, Germans, and in general all those principal nations mentioned in ancient history, so far as any accounts of them are come down to us

If to the general subjects above mentioned we add the particular study of antiques, of the statues, bas-reliefs, and the precious relics of architecture, painting, medals, &c it is easy to conceive that antiquities form a science very extensive and complicated, and highly deserving the attention of almost all literary men In this place, however, we can do little else than point out to the reader the principal sources of information to which he may apply

A sufficient knowledge of the general antiquities of the Hebrews may be obtained from the Bible, Philo and Josephus, and the Talmud; and, among the writers of more modern date, Arias Montanus, Carpsovius, Maimonides, Buxtorf, Reland, Leusden, Calmet, Witsius, Bucher, Benzelius, Bisinge, Hottinger, and Michaelis, may be deemed the best Among the English, Selden, Godwyn and Lewis Calmet's Dictionary of the Bible also contains many references for the curious reader, and those who would know how far their ancient and modern practices agree, may consult Levi's Jewish Ceremonies

On the civil history of the Jews Josephus may be consulted, with Strackford and Prideaux's Connections On the life and death of Moses, however, on the Exodus of the Israelites, and their leader on the Jewish kings, the Babylonish captivity, and on the history and condition of the Jews in different countries subsequent to their dispersion the writers are extremely numerous and a complete catalogue of them may be found in Mensel's Bibliotheca Historica On the destruction of Jerusalem, Josephus and Tacitus are the principal writers to repute And for the history of the Jews in England, Tovey's work may be referred to

But the most copious work on Jewish antiquities is Ugolinus's Thesaurus in thirty-four volumes folio, the first bearing the date of 1744, the last 1769 containing all the best works which previously to that time had appeared, on the manners, laws rites and institutions of the Hebrews amounting in number to no less than four hundred and eighty eight distinct treatises

The most curious collection of Hebrew manuscripts in this country which illustrate the literary antiquities of the Jews may be found in the Bodleian Library at Oxford Few of them in point of age run beyond eight hundred years, and the most ancient we believe, were brought by Dr Pococke from Constantinople

To recite even the titles of the different works in which the antiquities of Egypt have been treated, would be endless Among the ancient writers Herodotus Pausanias Strabo, Diodorus Siculus, and Plutarch are the principal Herodotus, Thales, and Pythagoras, it will be remembered, were initiated among the Egyptian priests The best work on the mythology of Egypt is Jablonski's Pantheon Egyptiacum On its present remains, Pococke Norden, Niebuhr, Sonnini, and Denon may be consulted Greaves and Norden have expressly written on the pyramids Kircher on the mummies and all that is material on the subject of the obelisks, may be found in Zoega De Obeliscorum Usu In the authentic narrative of Dr Wittman, modern readers will find some facts worthy of their attention, relative to the monumental remains still existing in Egypt

On the subject of the antiquities of India, we refer to Halhed's Code of Gentoo Laws, and the papers of sir William Jones and others in the Asiatic Researches

Gronovius has given a collection of the chief writers on the antiquities of Greece, to which we shall refer the reader once for all,

and Rouse, Pfeiffer, Bos, and bishop Potter, have given shorter systems, the last of which is certainly esteemed the best, and which no scholar's library should be without. In what relates to the religion, the gods, vows, and temples of Greece, it has been deemed too summary; but in the military affairs and miscellaneous customs it remained till lately without a rival. A work which supersedes it, and perhaps all others in the English language, for accuracy and completeness, has just made its appearance from the pen of Mr Robinson of Ravenstondale.

On the gods, temples, oracles, and priests of Greece, the writers are extremely numerous: on the public weal and magistracy of Greece, Stephanus, Laurentius and Van Dale, of modern writers, have perhaps the greatest share of credit: on the court of Areopagus, Meursius, and Freher: on the laws and punishments of Greece, Pricæus, Meursius, and Petit: on military concerns, Arrian, Polyænus, and Ælian, on the gymnastic art, and exercises of the Greeks, Hieronymus Mercurialis, Joubert, Faber, and Burette: on the theatres and scenic exhibitions, Donatus, Scaliger, Boindin, and the abbe Barthelemy, on their entertainments, luxury, and baths, Ciaconius, Meursius, Gedoyn, Du Choul, Ferrarius, and Kuhn, on their marriages and institution of their children, besides the general writers, Hauptmann, Junius, Stisser, and Zeibich, are the more particular: and on their funerals, Nicolai, Lancius, and Eckhard.

A body of the authors on the Roman antiquities was published by Grævius in the Thesaurus, and Danet and Pitiscus published lexicons of them. For the most part however they are too voluminous, not only to be generally useful, but even to refer the studious reader to except on single points. On this account a number of abridgements have been published, of which, till of very late years, those of Kennet and Nieuport were esteemed the best. The latter was written in Latin, but it abounded in difficult phrases, and was deficient in one or two material parts, which were supplied by Kennet. Both, however, have been since superseded by the work of Dr Adams, which, of all the abridgements, is the best adapted to illustrate the classics. It is sufficient to say that he has borrowed with freedom from all hands whatever he judged fit for his purpose, and the enumeration of his sources will prove the best aid to an enquiring reader. He was chiefly indebted to Manutius, Brissonius, and Middleton, on the senate; to Pignorius on slaves; to Sigonius and Grucchius, Manutius, Huber, Gravina, Merula, and Heineccius, on the assemblies of the people, the rights of citizens, the laws and judicial proceedings; to Lipsius on the magistrates, the art of war, shows of the circus, and gladiators; to Scheffer on naval affairs and carriages; to Ferrarius on the Roman dress; to Kirkmannus on funerals; to Arbuthnot on coins; to Dickson on agriculture; to Donatus on the city; to Turnebius, Abrahamus, Rossinus, Salmasius, Hottomanus, Grævius and Gronovius, Montfaucon, Pitiscus, Ernesti, and particularly Gesner, in different parts of the work.

On the antiquities of antient Rome, the works of Publius Victor, Fulvius, Fabricius, Onuphrius Panvinius, Boissard, and Adler, are perhaps the best: on its antient edifices, the work of Desgodetz, in which the views are given from actual measurement; Venuti's Descrizione Topografica delle Antichità di Roma, and D'Overbeke's Restes de l'Ancienne Rome: public ways, its walls, aqueducts, and bridges, Bergier, Gautier, and D'Anville may be referred to: while the statues and other works of art with which Rome and her provinces abounded have frequently furnished subjects for separate disquisitions.

A correct view of the antiquities of Britain from the earliest period to the end of Henry the Eighth's reign, may perhaps be best collected from Dr Henry's History. The writers he refers to will present the reader with all the most authentic sources of enquiry.

Of what relates to the early Britons, however, much that has been written is too nearly connected with the fabulous, and instead of seeking for information on Druidical history, where it was most likely to be obtained correctly, the generality of our writers have been too apt to busy themselves with theory and etymology. "Druidism," says one, "was palpably Phœnician. The Druidical system was taught the Gauls by Phythagoras!" The opinion however, which in Cæsar's time was generally entertained in Gaul has been overlooked. Cæsar evidently took considerable pains to learn every particular relating to the Druids, and he states it to have been the received opinion that Druidism originated in Britain. And in corroboration of this idea, it has been both strongly and correctly urged, that there is not a single authority for the existence of Druidism any where but in Celtic Gaul and part of England. Cæsar, however, did not himself witness its existence in Britain. Tacitus is the first, and, we believe, the only author who notices it, for the Romans did not meet with it till they had advanced far into Wales. Cæsar, Dio Cassius, and Tacitus, are the principal authorities in regard to British history. On the religious system, and the mysteries of Druidism, the writers are more numerous, but Cæsar, Diodorus Siculus, Ælian, Strabo, Tacitus and Pliny, are perhaps the most valuable of the antients. Cluverius's Germania Antiqua, and the works of Pezron and Pelloutier upon the Celts, are however more recent authorities.

Of the structures which the Britons erected the remains are few. Abury and Stonehenge may be deemed the principal. On the vast tracts of solitary down with which our island abounds, relics of a smaller kind are continually discovered. Rowbright in Oxfordshire affords the best, perhaps, and they are very numerous in Anglesey. On these Stukeley and Rowland are perhaps the best authorities for the history of the Britons under the Roman

government, we refer to Horsley's Britannia Romana Antonine's Itinerary preserves the names of the towns and stations on the Roman military ways, with the number of miles between each town

On the antiquities of our Saxon ancestors there is more to say, and we can trace their history with tolerable certainty The devastations of the Danes, however, proved a great destruction to their monuments, and though the Normans were the descendants of the same ancestors, they were not less injurious to the institutions of the people who had gone before them The best of their remains of art were evidently fabricated upon Roman models Their architecture exhibited, as its leading feature, a bad imitation of the Roman arch, and their coins had Latin inscriptions The little science they possessed during the middle and latter periods of their existence, though originally perhaps obtained from abroad, was cultivated with uncommon zeal and Alcuin, Bede, and Alfred, are names in the history of their literature that will never be forgotten The illuminations of the Saxon manuscripts are the best records of their manners in the different centuries, and the most curious information relating to them will be found in the elaborate works of Mr Strutt and Mr Turner In this branch of our antiquities the field of investigation is still open They have never yet been viewed upon that enlarged scale on which they deserve to be considered The best collection of Saxon coins is that which is now deposited in the British Museum Their remains of art are numerous, but for the most part undecided the Normans having imitated their exertions with little other difference than an occasional enlargement of the scale Of Saxon manuscripts, the best collection will be found in the library of the British Museum, and in the Bodleian Library at Oxford Mr King has treated their military antiquities in his History of Castles, and Dr Hickes's Thesaurus may be viewed as the grand repository of their general literature

Of the English nation at nearer periods, our documents, as may be naturally expected, occur in still greater variety There is scarcely a county history but sets our antient manners in new points of view They have been often and systematically treated, and the names of Camden, Henry, Strutt, and Gough, are sufficient to be noticed *Gregory's Dict*

Antiquity, signifies times or ages past long ago Thus, we say, the heroes of antiquity, &c

Antiquity, likewise expresses the great age of a thing in this sense we speak of the antiquity of a family, of a kingdom, and the like

ANTIRRHINUM (from *αντι*, *against*, and *ρις*, *the nose*, so called because it represents the nose of a calf) Snap dragon, toad-flax, or calf's-snout a genus of the class and order didynamia, angiospermia Calyx five-parted, corol with a nectariferous prominence at its base pointing downwards, the orifice closed, and furnished with a cloven, convex palate, capsule two-celled There are seventy species, which may be thus subdivided 1 Leaves angular, capsules many-valved 2 Leaves opposite, capsules many-valved 3 Leaves alternate, capsules many-valved 4 Corols without spur, capsules perforated with three pores 5 Leaves pinnatifid Every quarter of the globe gives birth to some of this numerous species Those indigenous to our own country are, a cymbalaria, found on old walls, ivy-leaved toad grass a spurium, in corn fields round-leaved-fluellin a repens, on chalk-hills, creeping toad flax a minus, in corn-fields, small toad-flax a linaria, in hedges, common yellow toad-flax a majus, on old walls, the greater snap dragon a orontium, in corn-fields, small snap dragon a arvense, in corn-fields, cornblue toad-flax

Antirrhinum linaria The systematic name for the linaria of the pharmacopœias See Linaria

ANTISABBATARIANS a modern religious sect, who oppose the observance of the Christian sabbath The great principle of the Antisabbatarians is that the Jewish sabbath was only of ceremonial not moral obligation, and consequently is abolished by the coming of Christ

ANTISAGOGE, in rhetoric, a figure differing little from that called concession The following passage from Cicero is an instance of it Difficilis ratio belli gerendi, at plena fidei plena pietatis et si dicas, magnus labor, multa pericula proponuntur, at gloria ex his immortalis est consecutura See Concession

ANTISCIANS, or Antiscii, in geography are people who dwell in the opposite hemispheres of the earth, as to north and south, and whose shadows at noon fall in contrary directions This term is more general than antæci, with which it is often confounded The Antiscians stand contradistinguished from Periscians

Antiscii is also used sometimes, among astrologers, for two points of the heavens equally distant from the tropics

ANTISCORBUTICS, (*antiscorbutica, sc medicamenta*, from *anti*, against, and *scorbutus*, the scurvy) Those medicines which cure the scurvy To this class belong oxygen gas, acids, vegetables bark, &c

ANTISEPTICS (*antiseptica, sc medicamenta*, *αντισηπτικα*, from *αντι*, *against*, and *σηπω*, *to putrefy*) Those medicines which possess a power of preventing animal substances from passing into a state of putrefaction, and of obviating putrefaction when already begun This class of medicine comprehends four orders 1 Tonic antiseptics, as cinchona, angustura cortex, chamæmelum, &c which are suited for every condition of body, and are, in general, preferable to other antiseptics, for those with relaxed habits 2 Refrigerating antiseptics, as acids, which are principally adapted for the young, vigorous, and plethoric 3 Stimulating antiseptics, as wine and alkohol, best adapted for the old and debilitated 4 Antispasmodic antiseptics, as camphora and assa-

fœtida, which are to be selected for irritable and hysterical habits

ANTISPASIS *s* (ἀντισπάω) The revulsion of any humour into another part

ANTISPASMODICK *a* (ἀντισπασμος) That has the power of relieving the cramp

ANTISPASMODICS, (*antispasmodica, sc medicamenta*, ἀντισπασμοδικα, from ἀντι, *against*, and σπασμος, *a spasm*) Those medicines which possess the power of allaying inordinate motions in the system, particularly those involuntary contractions which take place in muscles, naturally subject to the command of the will The medicines referable to this class are divided into two orders 1 Stimulating antispasmodics, as alkali volatile, olea essentialia, liquor ætherens, which are to be given to the melancholic and those with torpid habits 2 Sedative antispasmodics, as camphora, moschus, and opium, which are preferred to the former for sanguine and irritable habits

ANTISPLENETICK *a* (αντι and *splenetick*) Efficacious in diseases of the spleen (*Floyer*)

ANTISTASIS, in oratory, a defence of an action from the consideration that had it been omitted worse would have ensued This is called by Latin writers comparativum argumentum, such *e g* would be the general's defence who had made an inglorious capitulation, that, without it, the whole army must have perished

ANTISTASIS, the gibbous part of the liver in the Grecian victims

ANTISTHENES, a philosopher who taught rhetoric, and had among his pupils the famous Diogenes, but when he had heard Socrates, he shut up his school, and told his pupils, "Go seek for yourselves a master, I have now found one He was the head of the sect of the Cynic philosophers One of his pupils asked him, what philosophy had taught him? "To live with myself said he He sold his all, and preserved only a very ragged coat, which drew the attention of Socrates, and tempted him to say to the Cynic, who carried his contempt of dress too far, "Antisthenes, I see thy vanity through the holes of thy coat" Antisthenes taught the unity of God, but he recommended suicide Some of his letters are extant He flourished 396 years B C

ANTISTOECHON, in grammar, the using one letter instead of another, as olli for illi

ANTISTROPHE, that part of a dance, practised by the ancients, in which they turned towards the left, or from west to east, in surrounding the altars

ANTISTROPHE, in lyric poetry, an echo or replication to the strophe, anciently sung while the performers danced from east to west

ANTISTROPHE, in grammar, a figure by which two things mutually depending on one another, are reciprocally converted, as, the servant of the master, the master of the servant

ANTISTROPHE, in rhetoric See EPISTROPHE

ANTISTRUMATICK *a* (ἀντι and *struma*) Good against the kingsevil (*Wiseman*)

ANTITACTÆ, in church history, a branch of Gnostics, who held, that God was good and just, but that a creature had created evil, and consequently that it is our duty to oppose this author of evil, in order to avenge God of his adversary

ANTITHENAR, (*antithenar*, αντιθεναρ, from αντι, *against*, and θεναρ, *the palm of the hand*) A muscle of the foot See ADDUCTOR POLLICIS PEDIS

ANTITHESIS, in rhetoric, a contrast or opposition of words or sentiments Such is that of Cicero, in the second Catilinarian "On one side stands modesty, on the other impudence, on one fidelity, on the other deceit, here piety, there sacrilege, here continency, there lust, &c Such also is that of Augustus to some seditious young men Audite, juvenes, senem, quem juvenem senes audivere The following is a fine example of modern antithesis the author in speaking of the unparalleled animosity which inflamed the first war with the French republic, proceeds thus "Never before were so many opposing interests, passions, and principles committed to such a decision On one side an attachment to the ancient order of things, on the other a passionate desire of change, a wish in some to perpetuate, in others to destroy every thing every abuse sacred in the eyes of the former, every foundation attempted to be demolished by the latter, a jealousy of power shrinking from the slightest innovation, pretensions to freedom pushed to madness and anarchy, superstition in all its dotage, impiety in all its fury, whatever, in short, could be found most discordant in the principles, or violent in the passions of men, were the fearful ingredients which the hand of divine justice selected to mingle in this furnace of wrath" Hall's Thanksgiving Sermon

ANTITHESIS is sometimes used for controversy In this sense we meet with antithetic method, antithetic discourses, &c

ANTITRAGICUS, (*antitragicus, sc musculus*) One of the proper muscles of the ear, whose use it is, to turn up the tip of the antitragus a little outwards, and to depress the extremity of the antihelix towards it

ANTITRAGUS, (*antitragus*, from αντι, and τραγος, *the tragus*) An eminence of the outer ear, opposite to the tragus

ANTITRINITARIANS, those who deny the Trinity, and teach that there are not three persons in the Godhead Thus the Samosatenians, who do not believe the distinction of persons in God the Arians, who deny the divinity of the Word, and the Macedonians, who deny that of the Holy Spirit, are all properly Antitrinitarians Among the moderns, Antitrinitarians are particularly understood of Socinians

ANTITYPE, properly signifies a type or figure corresponding to some other type This word occurs twice in the New Testament,

viz in the Epistle to the Hebrews, ix 24 and in St Peter, 1 Eph iii 21 where its genuine import has been much converted

Antitype, among the ancient Greek fathers, and in the Greek liturgy, is also applied to the symbols of bread and wine in the sacrament

ANTITYPICAL a (from *antitype*) That relates to the antitype, that explains the type

ANTIVENEREAL a (αντι and *venereal*) Good against the venereal disease (*Wiseman*)

ANTIZYMICS, (from αντι and ζυμη, *fermentation*) Medicines which resist fermentation in the system

ANTLER s (*andouiller*, Fr) Branch of a stag's horns (*Prior*)

ANTOECI s (from αντι and οικεω) Those inhabitants of the earth who live under the same meridian at the same distance from the equator, the one toward the north, and the other to the south The antoeci have the same hours of day and night, but opposite seasons

ANTOMOSIA, (from αντι, and μοω, *I swear*,) in ancient writers an oath taken by both the parties in a criminal accusation, whereby the accuser charges the other with the fact, and the accused in his turn denies the same

ANTONIA The name of some eminent Roman ladies, the most remarkable of whom was the wife of Drusus, the son of Livia, and brother of Tiberius She became mother of three children, Germanicus, Caligula's father, Claudius the emperor, and the debauched Livia Her husband died very early, and she never would marry again, but spent her time in the education of her children Some people suppose her grandson Caligula ordered her to be poisoned, A D 38

ANTONINUS, sirnamed Pius, was adopted by the emperor Adrian, to whom he succeeded This prince is remarkable for all the virtues that can form a perfect statesman, philosopher, and king In cases of famine or inundation, he relieved the distressed, and supplied their wants with his own money In his behaviour to his subjects, he behaved with affability and humanity, and listened with patience to every complaint brought before him When told of conquering heroes, he said with Scipio, I prefer the life and preservation of a citizen, to the death of 100 enemies He did not persecute the christians like his predecessors, but his life was a scene of universal benevolence His last moments were easy, though preceded by a lingering illness He extended the boundaries of the Roman province in Britain, by raising a rampart between the friths of Clyde and Forth, but he waged no wars during his reign, and only repulsed the enemies of the empire who appeared in the field He died in the 75th year of his age, after a reign of 23 years, A D 161, and was succeeded by his adopted son M Aurelius Antoninus, sirnamed the Philosopher, a prince as virtuous as his father, and whose book of Meditations is universally known and admired

Antoninus's Wall, the name of the third rampart or defence that had been built or repaired by the Romans against the incursions of the North Britons It is called by the people in the neighbourhood, Graham's Dyke, from the notion that one Graham or Grimus first made a breach in it after the retreat of the Romans out of Britain The first barrier erected by the Romans was the chain of forts made by Agricola from the frith of Forth to that of Clyde, in the year 81, to protect his conquests from the inroads of the Caledonians The second was the vallum, or dyke, flung up by Adrian in the year 121 It terminated on the western side of the kingdom, at Axelodunum or Brugh, on the Solway sands, and was supposed to have reached no further than Pons Ælii, or Newcastle, on the eastern But from an inscription lately discovered, it appears to have extended as far as the wall of Severus This rampart of Adrian's was situated much further south than Agricola's chain the country to the north having been either, according to some authors, recovered by the native Briton after the departure of Agricola or, according to others, voluntarily slighted by Adrian However, this work of Adrian's did not long continue to be the extreme boundary of the Roman territories to the north in Britain For Antoninus Pius the adopted son and immediate successor of Adrian having, by his lieutenant Lollius Urbicus recovered the country once conquered by Agricola, commanded another rampart to be erected between the friths of Forth and Clyde, in the tract where Agricola had formerly built his chain of forts The great number of inscriptions which have been found in or near the ruins of this wall, or in part, to the honour of Antoninus Pius leave us no room to doubt its having been built by his direction and command If the fragment of a Roman pillar with an inscription, now in the college library of Edinburgh, belonged to this work, as it is generally supposed to have done, it fixes the date of its execution to the third consulship of Antoninus, which was A D 140, only twenty years after that of Adrian of which this seems to have been an imitation This wall or rampart, as some imagine reached from Caer ridden on the frith of Forth, to Old Kirkpatrick on the Clyde, or, as others think, from Kinniel on the east, to Dunglass on the west These different suppositions hardly make a mile of difference in the length of this work, which, from several actual mensurations, appear to have been thirty-seven English or forty Roman miles Capitolinus, in his life of Antoninus Pius, directly affirms, that the wall which that emperor built in Britain was of turf This in the main is unquestionably true, though it is evident (from the vestiges of it still remaining, which not very many years ago were dug up and examined for near a mile together) that the foundation was of stone Mr Camden also tells us, from the papers of one

Mr Anthony Pont, that the principal rampart was faced with square stone, to prevent the earth from falling into the ditch The chief parts of this work were as follows 1 A broad and deep ditch, whose dimensions cannot now be discovered with certainty and exactness, though Mr Pont says it was twelve feet wide 2 The principal wall or rampart was about twelve feet thick at the foundation but its original height cannot now be determined This wall was situated on the south brink of the ditch 3 A military way on the south side of the principal wall, well paved, and raised a little above the level of the ground This work, as well as that of Adrian, was defended by garrisons placed in forts and stations along the line of it The number of these forts or stations, whose vestiges were visible in Mr Pont's time, were eighteen situated at about the distance of two miles from each other In the intervals between the forts there were turrets or watch towers But the number of these, and their distance from each other, cannot now be discovered

It is not a little surprising, that though it is now more than 1600 years since this work was finished, and more than 1300 since it was slighted, we can yet discover from authentic monuments, which are still remaining, by what particular bodies of Roman troops almost every part of it was executed This discovery is made from inscriptions upon stones, which were originally built into the face of the wall, and have been found in or near its ruins and are carefully preserved The number of stones with inscriptions of this kind now extant is eleven of which six may be seen at one view in the college of Glasgow, one in the college of Aberdeen one in the college of Edinburgh, one in the collection of baron Clerk one at Cochnoch house and one at Calder house From these inscriptions it appears in general, that this great work was executed by the second legion the vexillations of the sixth legion and of the twentieth legion, and one cohort of auxiliaries If these corps were all complete they would make in all a body of 7500 men Some of these inscriptions have suffered greatly by the injuries of time and other accidents so that we cannot discover from them with absolute certainty, how many paces of this work were executed by each of these bodies of troops The sum of the certain and probable information contained in these inscriptions, as it is collected by the learned and illustrious Mr Horsley, stands thus

	Paces
The second legion built	11,603
The vexillation of the sixth legion	7,411
The vexillation of the twentieth legion	7,801
All certain	26,815
The vexillation of the twentieth legion, the monument certain, and the number probable	3,411
The same vexillation, on a plain monument, no number visible, supposed	3,500
The sixth legion, a monument, but no number, supposed	3,000
Cohort prima Cugernorum	3,000
Total	39,726

or 39 miles 726 paces, nearly the whole length of the wall It would have been both useful and agreeable to have known how long time these troops were employed in the execution of this great work But of this we have no information Neither do we know what particular bodies of troops were in garrison in the several forts and stations along the line of this wall, because these garrisons were withdrawn before the Notitia Imperii was written

ANTONIO, (St) one of the Cape de Verd islands, on the African coast It is full of high mountains Lat 17 0 N Lon 25 0 W

M ANTONIUS, a name common to many illustrious Romans, the most conspicuous of whom was Marcus, the triumvir, grandson to the orator M Antonius, and son of Antonius, surnamed Creticus He was augur and tribune of the people, in which he distinguished himself by his ambitious views He always entertained a secret resentment against Cicero, for having put to death Corn Lentulus, who was concerned in Catiline's conspiracy When the senate was torn by the factions of Pompey's and Cæsar's adherents, Anthony privately retired from Rome to the camp of Cæsar, advised him to march his army to Rome, took the command of the left wing at Pharsalia, and according to a preconcerted scheme, offered him a diadem in the presence of the Roman people When Cæsar was assassinated Antony pronounced an oration over his body He besieged Mutina, which had been allotted to D Brutus for which the senate judged him an enemy to the republic, at the remonstration of Cicero He was conquered by the consuls Hirtius and Pansa, and by young Cæsar, who soon after joined his interest with that of Antony, and formed the triumvirate celebrated for its cruel proscriptions The triumvirate divided the Roman empire among themselves He then assisted Augustus at the battle of Philippi against the murderers of J Cæsar, and he buried the body of M Brutus, his enemy, in a most magnificent manner During his residence in the East, he became enamoured of the fair Cleopatra queen of Egypt, and repudiated Octavia to marry her This divorce incensed Augustus, who now prepared to deprive Antony of all his power Antony assembled all the forces of the East, and with Cleopatra marched against Octavius Cæsar These two enemies met at Actium, where a naval engagement soon began, and Cleopatra, by flying with 60 ships, drew Anthony from the battle and ruined his cause After the battle of Actium, Antony followed Cleopatra into Egypt, where he found himself abandoned by all his allies, and saw the conqueror on his shores He stabbed himself, and Cleopatra likewise killed herself with the bite of an asp Antony died in the 56th year of his age, B C 30, and the conqueror shed tears

when he was informed that his enemy was no more He has been blamed for his great effeminacy, for his uncommon love of pleasures, and his fondness of drinking In his public character he was courageous, but with the intrepidity of Cæsar, he possessed all his voluptuous inclinations His fondness for low company, and his debauchery, form the best parts of Cicero's Philippics Plutarch has written an account of his life

ANTONOMASIA, a form of speech, in which, for a proper name, is put the name of some dignity office, profession, science, or trade, or when a proper name is put in the room of an appellative Thus a king is called his majesty, a nobleman, his lordship We say the philosopher instead of Aristotle and the orator for Cicero Thus a man is called by the name of his country, a German, an Italian, a grave man is called Cato, and a wise man a Solomon

ANTOSIANDRIANS a sect of rigid Lutherans, who oppose the doctrine of Osiander relating to justification These are otherwise denominated Osiandromastiges The Antosiandrians deny that man is made just, with that justice wherewith God himself is just, that is, they assert, that he is not made essentially, but only imputatively just

ANTRIM, a county of the province of Ulster in Ireland bounded by St George's Channel on the East, by Londonderry on the West, by the Deucaledonian Ocean on the North, and by the county of Down on the South-East It contains about 383,000 acres Its soil is fruitful The large inland lake in this county, called Loughneagh is remarkable for petrifying wood On the coast of Antrim is a celebrated pile of rocks which the country people fondly imagined to have been the work of giants, and for that reason it is called The Giant's Causeway

ANTRIM, the capital of the above county It is a corporation and a market town Lat 54 43 N Lon 6 0 W

ANTRUM HIGHMORIANUM (antrum of Highmore) Antrum Antrum genæ Sinus maxillaris pituitarius A large cavity in the middle of each superior maxillary bone between the eye and the roof of the mouth, lined by the mucous membrane of the nose, and first described by Highmore

ANTS, ACID OF See FORMIC ACID

ANTWERP, the capital of Brabant in the Austrian Netherlands This was a place of great trade about 200 years ago, the greater part of which is removed to Amsterdam It is built in the form of a crescent The harbour is very handsome and commodious the water being about 22 feet deep and 400 wide, so that large vessels may come up to the quay The public buildings are beautiful and convenient, and are about 200 in number The streets are large and regular, and the citadel is supposed to be one of the strongest in the Low Countries Lat 51 13 N Lon 4 2 E

ANTYX, in antiquity, the circumference of a shield

ANUBIS, an Egyptian deity, represented under the form of a man with the head of a dog, because when Osiris went in his expedition against India, Anubis accompanied him, and clothed himself in a sheep's skin His worship was introduced from Egypt into Greece and Italy He is supposed by some to be Mercury because he is sometimes represented with a caduceus or wand Some make him son of Osiris others, his brother

A'NVIL s (anfille, Saxon) 1 The iron block on which the smith lays his metal to be forged (*Dryden*) 2 Any thing on which blows are laid (*Shakspeare*)

ANVILLE (John Baptiste Bourguignon d') geographer to the king of France was born at Paris in 1697 He was a most industrious student labouring it is said, fifteen hours a day for fifty years, to improve his favourite science His maps are in the highest estimation, and his works are all valuable They are as follow 1 A Dissertation on the Extent of the ancient Jerusalem, 1747, 8vo 2 Some Particulars of ancient Gaul, drawn from the Remains of the Romans, 1761, 4to 3 On ancient and modern Egypt, with a Description of the Arabian Gulph, 1766, 4to 4 An Abridgment of ancient Geography, 1768, 3 vols 12mo 5 A Treatise on itinerary Measures ancient and modern 1769, 8vo 6 The Governments formed in Europe after the Fall of the Roman Empire, 1771 4to

ANUS (anus quasi onus as carrying the burden of the bowels,) or according to Quintilian from anus a ring or circle of any kind, this being the termination of the circular intestinal tube, and the ancients not being accustomed to double their consonants, veteres enim says he non geminabant consonantes The fundament Also the small opening of the third ventricle of the brain, which leads into the fourth

ANXI'ETY s (anxietas, Latin) 1 Trouble of mind about some future event perplexity, solicitude (*Tillotson*) 2 Depression lowness of spirits (*Arbuthnot*)

A'NXIOUS a (anxius, Latin) 1 Disturbed about some uncertain event (*Pope*, Careful full of inquietude (*Dryden*)

A'NXIOUSLY ad (from anxious) Solicitously, unquietly, carefully (*South*)

A'NXIOUSNESS s (from anxious) The quality of being anxious

A'NY a (anig, enig Saxon) 1 Every whoever he be (*Pope*) 2 Whosoever, whatsoever (*Shakspeare*)

AONIDES, in mythology, one of the many appellations of the muses, so called from Aonia, a part of ancient Bœotia

AORASIA, in antiquity the invisibility of the gods The word is Greek, αοϱασια, and derived from α priv and ϱαω to see The opinion of the ancients with regard to the appearance of the gods to men, was, that they never showed themselves face to face but were known from their backs as they withdrew Neptune assumed the form of Calchas to speak to the two Ajaxes but they knew him not till he turned his back to leave them and discovered the god by his majestic step as he went from

them. Venus appeared to Æneas in the character of a huntress; but her son knew her not till she departed from him; her divinity was then betrayed by her radiant head, her flowing robe, and her majestic pace.

AORIST, among grammarians, a tense peculiar to the Greek language, comprehending all the tenses, or rather expressing an action in an indeterminate manner, without any regard to past, present, or future.

AORISTIA, in the sceptic philosophy, denotes that state of the mind wherein we neither assert nor deny any thing positively, but only speak of things as seeming or appearing to us in such a manner.

AORTA (*aorta* ἀορτή, from ἀηρ, *air*, and τηρεω, *to keep*, so called because the ancients supposed that only air was contained in it.) The great artery of the body, which arises from the left ventricle of the heart, forms a curvature in the chest, and descends into the abdomen, and from which all the other arteries arise, except the pulmonary arteries. See ARTERY.

AORTERA (from αηρ, *air*, and τηρεω, *to hold or keep*.) The lobes of the lungs, the receptacles of respirable air.

AOUSTA, a territory of Piedmont, with the title of a duchy. The capital is of the same name, and lies in Lat. 45. 48. N. Lon. 7. 32. E.

APACE, *ad.* 1. Quick, speedily, hastily.

APACTIS. In botany, a genus of the class and order dodecandria, monogynia. Calyxless, petals four, circular, unequal, germ superior, fruit? The only known species is a native tree of Japan.

APAEDEUSIA, denotes ignorance or unskilfulness in what relates to learning, and the sciences. Hence also persons uninstructed and illiterate are called apædeuti. The term apædeuti was particularly used among the French in the time of Huet, when the men of wit at Paris were divided into two factions, one called by way of reproach apædeuta, and the other erudite.

APAGOGE, in logic. See ABDUCTION.

APAGOGE, in the Athenian law, the carrying a criminal taken in the fact to the magistrate. If the accuser was not able to bring him to the magistrate, it was usual to take the magistrate along with him to the house where the criminal lay concealed, or defended himself.

APAGOGE, in mathematics, is sometimes used to denote a progress or passage from one proposition to another; when the first having been once demonstrated, is afterwards employed in the proving of others.

APAGOGICAL DEMONSTRATION, an indirect way of proof, by showing the absurdity of the contrary.

APALACHION. See ALLEGANY MOUNTAINS.

APALLAGE (from απαλλασσω, *to change*.) A change or crisis in a disease, by which it is subdued.

APALUS. In zoology, a genus of the class and order insecta, coleoptera. Antennas filiform, feelers equal, filiform, jaw horny, one-toothed, lip membranaceous, truncate, entire. Two species, a. bimaculatus, black, shells testaceous with a black dot. Inhabits the sandy plains of Europe. a. quadrimaculatus. Rufous head, and two spots on the shells black. Inhabits North America.

APAMÆA, or APAMIA, in ancient geography, a town of Syria, situated in a marshy country at the confluence of Orontes and Marsyas, which form a kind of lake, that has no communication with the land but by a small isthmus. It is about 60 miles almost south of Antioch, and about 90 from Aleppo, in N. lat. 35. 0. E. lon. 37. 18. Its former name was Pharnacea; and the Macedonians called it Pella, and as it was surrounded by water, it was denominated Cherronesus.

APANAGE, or APPENNAGE, in the French customs, were lands assigned by the sovereign for the subsistence of his younger sons, which were to revert to the crown upon the failure of male issue in that branch to which the lands were granted.

APANTHROPY, denotes a love of solitude, and aversion from the company of mankind.

APARGIA. In botany, a genus of the class and order syngenesia polygamia æqualis. Receptacle naked, calyx imbricate, down feathery, sessile. Seventeen species, chiefly natives of the Barbary coast and south of Europe. The following are produced in our own country. A. hirsuta, on our mountains; a. autumnalis, in our meadows; a. hispida, in our pastures.

APARINE, (*aparine* απαρινη, from αρην, *a file*, because its bark is rough and rasps like a file.) Cleavers, or goose grass. This plant, which is common in our hedges and ditches, is the galium aparine, foliis octonis lanceolatis, carinatis scabris retrorsum aculeatis, geniculis villosis, fructu hispido, of Linnéus. The expressed juice has been given with advantage as an aperient and diuretic in incipient dropsies, but the character in which it has of late been chiefly esteemed is that of an anticarcinomatous remedy. A tea-cup full, gradually increased to half a pint two or three times a day, is said upon good authorities to have cured cancers.

APARITHMESIS, in rhetoric, denotes the answer to the protasis or proposition itself. Thus, if the protasis be, Appellandi tempus non erat,—The aparithmesis is, At tecum anno plus vixi.

APART, *ad.* (*apart*, French.) 1. Separately from the rest in place (*Clarendon*). 2. In a state of distinction (*Dryden*). 3. At a distance, retired from the other company (*Shakspeare*).

APARTISMENUS, in the ancient poetry, an appellation given to a verse, which comprehended an entire sense or sentence in itself. This is sometimes also written apartemenus, i. e. suspended, as not needing any subsequent verse.

APARTMENT, a portion of a large house, wherein a person may lodge separately, having all the conveniencies requisite to make a complete habitation.

APATE, a tribe of Fabricius. See DERMESTES.

APATHY, among the ancient philosophers, implied an utter privation of passion, and an insensibility to pain. The word is compounded of *a* priv. and παθος *affection*. The Stoics affected an entire apathy. They considered it as the highest wisdom to enjoy a perfect calmness or tranquillity of mind, incapable of being ruffled by either pleasure or pain. In the first ages of the church, the Christians adopted the term apathy to express a contempt of all earthly concerns.

APATURIA, a solemn feast celebrated by the Athenians in honour of Bacchus: this feast lasted four days. Its origin is uncertain.

APAULIA, in antiquity, the day of a marriage solemnity, whether the second or third is not certain, on which the bride presented her bridegroom with a garment called ...

APE, s. (*ape*, Icelandish.) 1. A kind of monkey. (See SIMIA.) 2. An imitator. (S...)

To APE, *v. a.* (from *ape*.) To imitate, as an ape imitates human actions. (*Addison*.)

APEAK, *ad.* (*a pique*, Fr.) In posture to pierce, formed with a point.

APEHA of the Brazilians. See STOMATAR...

APELLES, a celebrated painter of Cos, or, as others say, of Ephesus, son of Pitius. He lived in the age of Alexander the Great, who honoured him so much that he forbid any man but Apelles to draw his picture. He was so attentive to his profession that he never spent a day without employing his pencil: whence the proverb of *Nulla dies sine linea*. His most perfect picture was Venus Anadyomene, which was not totally finished when the painter died. He made a painting of Alexander holding thunder in his hand, so much like life, that Pliny, who saw it, says that the hand of the king with the thunder seemed to come out of the picture. This picture was placed in Diana's temple at Ephesus. He painted another of Alexander, but the king expressed not much satisfaction at it; and at that moment a horse passing by, neighed at the horse which was represented in the piece, supposing it to be alive, upon which the painter said, "One would imagine that the horse is a better judge of painting than your majesty." He wrote three volumes upon painting, which were still extant in the age of Pliny. Apelles never put his name to any pictures but three, namely, a sleeping Venus, Venus Anadyomene, and an Alexander. (*Plin.* &c.)

APELLITÆ, in the primitive church, denotes those who taught, in the ... that Christ left his body dissolved in the air, and so ascended into heaven without it.

APENE, in antiquity, a superb chariot whereon the images of the gods were carried in procession on certain days.

APENNINES. See APPENNINES.

APEPSIA (απεψια, απεψια, from α, priv. and πεπτω, *to digest*.) Indigestion.

APER, in zoology, a synonym of the Sus scrofa. See SUS.

APEREUXIS, (απερευξις, from απερευγομαι, *to eructate*.) Eructation.

APERIENS PALPEBRARUM RECTUS. See LEVATOR PALPEBRÆ SUPERIORIS.

APERIENTS, (*aperientia, sc. medicamenta*, from *aperio*, to open.) Eccoprotics. Laxatives. Medicines which gently open the bowels, such as magnesia, electuarium e cassia, electuarium e senna, kali vitriolatum, &c.

APERTIONS, in architecture, the openings in a building, as for windows, doors, &c. It is a maxim that these should not be numerous, nor approach too near the angles of the walls.

APERTURE, s. The opening of any thing, or a hole, cleft, or vacant place, in some otherwise solid or continuous subject. The word comes from aperire, to open.

APERTURE, in geometry, is used for the space left between two lines which mutually incline towards each other to form an angle.

APERTURE, in optics, is the hole next the object-glass of a telescope or microscope, through which the light and the image of the object come into the tube, and are thence conveyed to the eye.

Aperture is also understood of that part of the object-glass itself which covers the former, and which is left pervious to the rays.

A great deal depends upon having a just aperture.—To find it experimentally, Dr Hutton gives in his Mathematical Dictionary the following excellent rule: apply several circles of dark paper, of various sizes, upon the face of the glass, from the breadth of a straw to such as leave only a small hole in the glass; and with each of these separately, view some distinct objects, as the moon, stars, &c. then that aperture is to be chosen through which they appear the most distinctly.

Huygens first found the use of apertures to conduce much to the perfection of telescopes; and he found by experience (Dioptr. prop. 56.) that the best aperture for an object-glass, for example of 30 feet, is to be determined by this proportion, As 30 to 3, so is the square root of 30 times the distance of the focus of any lens, to its proper aperture; and that the focal distances of the eye-glasses are proportional to the apertures. And M. Auzout says he found by experience, that the apertures of telescopes ought to be nearly in the subduplicate ratio of their lengths. It has also been found by experience that object-glasses will admit of greater apertures, if the tubes be blacked within, and their passage furnished with wooden rings.

It is to be noted, that the greater or less aperture of an object-glass does not increase or diminish the visible area of the object, all that is effected by this is the admittance of more or fewer rays, and consequently the more or less bright appearance of the object. But the largeness of the aperture or focal distance, causes the irregularity of its refractions. Hence, in viewing Venus through a telescope, a much less aperture is to be used than for the moon or Jupiter, or Saturn, because her light is so bright and glaring. And this circumstance somewhat invalidates and disturbs Azout's proportion, as is shewn by Dr Hook, Philos. Trans. No 4.

Aperture, in hydraulics, the hole or orifice in the bottom or side of a vessel, through which a fluid issues. The determination of the velocity and other circumstances attending liquids flowing through such apertures is a matter of no small labour and difficulty. The subject was investigated by Newton in his Principia, and subsequently by Daniel Bernoulli and D'Alembert, each of whom made valuable additions to the propositions of Newton. But since it has been found that no satisfactory result could be obtained from theory alone, a distinct class of investigators have deduced chiefly from experiment the general laws by which the phenomena appear to be regulated. Among this latter class of investigators the chevalier de Buat, citizen Venturi, and Mr Eytelwein an ingenious German, are the most noted. The latter gentleman having properly combined theory with experiment has given much curious and useful information in his Handbuch der Mechanik und der Hydraulik; we shall in this place state a few of his results.

Newton shewed that the velocity of water flowing out of a horizontal aperture is as the square root of the height of the head of water, or that the pressure, and consequently the height, is as the square of the velocity. And the proposition thus stated is fully confirmed by Bossut's experiments, the proportion between the [illegible] with pressures of 1, 4, and 9 feet being 2720, 5130, and [illegible] instead of 2722, 5444 and [illegible], a very inconsiderable difference. This being the case, the velocity flowing out must be nearly equal to that of a heavy body falling from the height of a head of water, and which is found very nearly by multiplying the square root of that height in feet by 8 for the number of feet descended in a second. Thus a head of one foot gives 8, a head of 9 feet 24. Here though we must not neglect a well known circumstance (of which we shall presently speak more at large), namely, the contraction of the stream or vein of water, after it has passed the aperture. This contraction out of a simple orifice in a thin plate, reduces the area of the section at the distance of about half the diameter from the orifice, from 1 to ·[illegible] or ·[illegible], according to Bossut, to ·[illegible] according to Venturi, and to ·64 or [illegible], according to Eytelwein's experiments; hence the diameter is reduced to [illegible]. The quantity of water discharged is very nearly, but not quite, sufficient to fill this section with the velocity due, or corresponding to the height; therefore, to find more accurately the quantity discharged, the orifice must be supposed to be diminished to ·619 or nearly $\frac{5}{8}$; and hence we may multiply the square root of the height by 5 instead of 8, for the mean velocity in a simple aperture.

If we apply the shortest pipe that will cause the stream to adhere every where to its sides, which will require its length to be twice its diameter, the discharge will be about $\frac{13}{16}$ of the full quantity, and the velocity may be found by taking $6\frac{1}{2}$ for a multiplier. The greatest diminution is produced by inserting a pipe so as to project within the reservoir, probably because of the greater interference of the motions of the particles approaching its orifice in all directions; in this case the discharge is reduced nearly to a half. A conical tube approaching to the figure of the contraction of the stream, procured a discharge of ·92, and when its edges were rounded off, of ·98, calculating on its least section. Venturi has asserted that the discharge of a cylindrical pipe may be increased, by the addition of a conical tube, nearly in the ratio of [illegible] to 2, but Eytelwein finds this assertion rather too strong, and says that when the pipe is already very long, scarcely any effect is produced by the addition of such a tube. He made a number of experiments however, which in [illegible] measure confirm the assertion that a compound conical pipe may increase the discharge [illegible] twice and [illegible] half as much as through a simple aperture, or to more than half as much [illegible] would fill the whole section with the velocity due to the height; so that the observation of Venturi is just, except when a considerable length of pipe intervenes.

[illegible] table of the coefficient for finding the mean velocity of the water discharged by the pressure of a given head under different circumstances. 1. For the whole velocity due to the height, the coefficient by which its square root is to be multiplied is 8·0[illegible]. 2. For an orifice of the form of the contracted stream, [illegible]. 3. For wide openings of which the bottom is on a level with that of the reservoir, for sluices with walls in a line with the orifice, for bridges with pointed piers, 7·[illegible]. 4. For narrow openings of which the bottom is on a level with that of the reservoir, for smaller openings in a sluice with side walls, for abrupt projections and square piers of bridges, 6·9[illegible]. 5. For short pipes from two to four times as long as their diameter, 6·6[illegible]. 6. For openings in sluices without side walls, 5·[illegible]. 7. For apertures in a thin plate, [illegible].

Having thus stated the results of Mr Eytelwein's observations, we should now close this article, were we not convinced that the reader who pursues have taken a scientific turn would complain of us were we to say nothing of the theory. And indeed, on a subject of such importance, a subject which after all, has derived considerable advantages from a judicious application of theory, it would be unpardonable not to appropriate a few lines to the purpose of satisfying the enquiries of the man of science on this difficult point. When water issues from a small aperture in the bottom or side of a vessel which is kept constantly full, it has been commonly supposed and asserted, that the force accelerating the lowest plate of water (for the fluid has been conceived to act as an infinite number of extremely thin plates or laminæ of matter,) of indefinitely little altitude, immediately over the orifice, is the weight of the incumbent water only; and, therefore, that after the motion of the plate has once commenced, the pressure of the incumbent column will be diminished, and of

consequence the force accelerating the plate, during its descent through its own altitude, will not be constant.

But, in fact, it is not the pressure of the incumbent water, which accelerates the lowest plate; for every plate of water immediately incumbent over the hole, abstracting from all lateral pressure, begins to be accelerated equally at the same moment; and therefore the incumbent column, exclusive of any lateral pressure, could produce no increase of velocity in proportion to its increased height. The force which really accelerates the issuing plate, is the pressure of the ambient water, which surrounds the cylinder immediately over the aperture; and this lateral pressure being communicated to the upper surface of the plate, must be as much increased by the velocity of the superior descending plate, as it is diminished by that of the inferior issuing plate, so as to remain constantly of the same magnitude.

On this principle it can be easily demonstrated, that the velocity with which water spouts from an aperture in the bottom or side of a vessel, is equal to that which a heavy body would acquire in falling through the height of the fluid above the orifice.

This demonstration, however, as Mr. Atwood observes, is true only on the hypothesis that the water suffers no resistance, but issues in a cylindrical or prismatic form corresponding to the hole. But, in fact, the velocity of the water according to theory will be diminished by the friction of the particles against the edges of the orifice, from their mutual attraction, by which the issuing particles are retarded by those which are still in the vessel, and have not acquired the velocity of those which precede them, but principally from the obliquity of their motions.

For, as chev. Du Buat observes, when water issues from an orifice, the particles will flow from all sides, towards the orifice, with an accelerated motion, and in all directions. If the orifice be horizontal, that filament of particles which answers to the centre of the hole will descend in a vertical line, and will suffer no other resistance than that of the friction caused by the excess of its velocity above that of the collateral filaments, or by the retardation which arises from the attraction subsisting between them. The other filaments, after they have descended vertically for some time, are compelled to turn from their vertical course, and to approach the orifice in different curves, and when they arrive at it, their directions become more or less horizontal, according as they pass nearer to or farther from the edge of the orifice. The motion thereof is decomposed according to two directions, the one horizontal, which is destroyed by the equal and contrary resistance of the filaments which are diametrically opposite, the other vertical, in proportion to which the quantity of water discharged is to be estimated. Hence we see, that the vertical velocity of the filaments decreases from the centre of the orifice to its circumference, and that the total discharge is less than if all the filaments had issued vertically in the same manner with that which answers to the centre of the aperture. It also follows, that the filaments which are nearer to the centre, moving faster than those which are nearer to the edges of the vein of the fluid, after it has issued from the orifice, will form a cone whose base is the orifice; that is to say, that its diameter will diminish, at least, to a certain distance, because the exterior filaments are gradually drawn on, in consequence of their mutual attraction, by the interior filaments whose velocity is greater; whence there follows a diminution in the diameter of the vein.

This manner of accounting for the contraction of the vein seems more reasonable than that which is given by Newton, as there appears to be no adequate cause for the acceleration of the water, after it has been discharged from the orifice.

The diminution of the mean velocity of the water, caused solely by the obliquity of the motions of the issuing particles, exclusive of any other impediment, may be thus determined: conceive the aperture to be a horizontal one, nearly in the middle of the bottom of a vessel filled with water: now, in whatever direction the water issues, its velocity in that direction will, in all cases, be the same, because the pressure of fluids is the same in all directions; thus, whether a fluid spouts perpendicularly upwards or downwards, horizontally or obliquely, the space through which it is projected, in a given time, is the same. Now to determine this direction, since the horizontal and vertical pressures are equal, the issuing particles will assume the intermediate direction, which will therefore form an angle of 45° with the plane of the orifice: its vertical velocity therefore will be less than its direct or total velocity in the proportion of the diagonal of a square to its side, or as 7 to 5 nearly; but the particles of the central filament issue with the full velocity due to the entire height of the water; therefore the velocity of the central particles will be to the mean velocity as 7 to the mean between 7 and 5, or as 7 to 6. This is the diminution, as has been said, which takes place in consequence solely of the obliquity of the motions with which the particles issue from the orifice: if the other causes of retardation be taken into the account, we may conclude, that the velocity should be diminished in the ratio of 8 or even 9 to 6, which accords very well with experiments. Thus, besides the proportions already mentioned in the preceding part of this article, Polenus makes the ratio of the diameters of the contracted vein and aperture, which is the same with that of the mean and greatest velocity, to be as 5½ to 6½, Bernoulli 5 to 7, chev. Du Buat 6 to 9. When the orifice is infinitely little, the cylinder of issuing water becomes a single filament, which is therefore discharged without any obliquity, and there will be no diminution of velocity, except such as arises from friction and the tenacity of the particles. If the aperture be increased so as to become equal to the

base of the vessel, the column of water will then descend like a falling body, and therefore the velocity will be the same as before, but it will not acquire this velocity until the uppermost plate of water has been discharged. At the beginning of the motion, the first or lowest plate will flow out with a velocity indefinitely little, the next plate with a greater velocity, and so on, until the upper plate shall have descended to the orifice, which will then issue with the greatest velocity. But if the vessel be supposed to be kept constantly full, the velocity of the effluent water will increase so as at length to become equal to that which a heavy body would acquire in falling from an infinite height.

Since the middle filament of particles is discharged with the full velocity due to the entire altitude of the fluid above the orifice, experiments made on the distance or height to which fluids spout will be found to agree very well with theory, but it by no means follows, that all the filaments should be discharged with the same velocity: the quantity of the fluid therefore discharged in a given time, may be less than that which would be discharged if all the filaments were discharged with the velocity due to the entire altitude, because this quantity depends on the mean velocity of all the filaments. Hence, therefore, it cannot be inferred from these experiments compared with those which relate to the height or distance to which the fluid spouts, that the velocity of the water in the orifice is less than that which is due to the entire altitude, and that it is accelerated immediately after it gets out of it, because the distance to which the fluid spouts depends on the central filament only, but the quantity discharged on the mean velocity of the whole.

In the course of the different hydrostatical articles which will fall in the compass of our work, the reader will have frequent occasion to call these observations to mind: if he is desirous to pursue this branch of the subject to greater extent, we refer him to an ingenious paper in vol. vii of the Irish Transactions, by Dr. Thomas Young, some of whose reasoning we have here adopted. See also Gregory's Mechanics, vol. i.

APEUTHYSMENUS (from ἀπὸ and εὐθὺς, *straight*) A name of the intestinum rectum, or straight gut.

APEX, the vertex, tip, or summit of any thing.

Apex, in antiquity, the crest of a helmet or, a kind of cap worn by the flamens.

Apex, in drawing or anatomy, the extremity of a part, as the apex of the tongue, apex of the nose, &c.

Apex, in botany, the tip or end. When applied to leaves, it is the upper extremity, farthest from the base or insertion. Ray calls the anther by this name.

APHÆRESIS, *s* (ἀφαίρεσις) A figure in grammar, that takes away a letter or syllable from the beginning of a word.

APHASIA (from ἀ and φημι, *I speak*) In the sceptic philosophy, denotes a state of doubt, wherein a person not knowing what to determine on, it is best for him to be silent. In this sense, aphasia stands opposite to phasis, under which are included both assertion and negation.

APHELION, Aphelia, *s. plur.* (ἀπὸ and ἥλιος, *the sun*) That part of the orbit of the earth, or a planet, in which it is most remote from the sun. The extremity A of the transverse axis of the elliptical orbit (fig. 2 pl. 5) is the aphelion. It is sometimes spelt aphelium.

The mutual attraction of the planets and satellites upon each other, causes a very minute motion in the places of their aphelia: their motions in longitude having the secular precession of the equinoxes deducted, are all found to be direct: both places and motions are expressed below, for the six chief planets.

Planets	Place of Aphelia, Jan 1800				Secular Motion Aph.		
	s	°	′	″	°	′	″
Mercury	8	14	20	50	1	33	45
Venus	10	7	59	1	1	21	0
Mars	5	2	24	4	1	51	40
Jupiter	6	11	8	40	1	34	33
Saturn	8	29	4	11	1	50	7
Georgium Sidus	11	16	30	31	1	29	2

The method of ascertaining these particulars, is shown in O. Gregory's Astron. p. 220. Vin. Astron. vol. i. p. 133, &c.

APHELLAN, the name of a bright star in the constellation Gemini, marked α.

APHILANTHROPY, *s* (ἀ and φιλανθρωπία) Want of love to mankind.

APHIS. Plant louse, puceron, or vine-fretter. A genus of the class and order insecta hemiptera. Snout inflected, sheath of five joints with a single bristle, antennas setaceous, longer than the thorax: wings four, erect, or wingless; legs formed for walking: abdomen with two obtuse, erect horns behind, and often a small style at the tail. The minute animals which compose this extraordinary genus, infest various plants, usually in large societies, obstructing their growth, and consuming their juices. They are sometimes winged, and sometimes wingless, without distinction of sex; in the spring they are viviparous, producing the young alive; in the autumn, and towards winter, when the chillier air seems to require a warmer covering and tenderer nursing, they are oviparous; and by a surprising aberration from the common laws of nature, it appears that one impregnation of the female is sufficient for many successive generations, without the farther assistance of the male. Seventy three species, uniformly deriving their specific name from the tree, shrub, or plant, on which they are commonly found. Of those chiefly known

in our own country, we may select (for some of which see Nat Hist pl XXII)

1 A salicis, willow louse, found on different species of the tree thus named, length nearly a quarter of an inch, colour yellowish grey, spotted with black Towards the end of September, multitudes of the full grown insects of this species, both winged and others, desert the willows on which they feed, and roam at large over every neighbouring object in such numbers, that nothing in their vicinity can be handled without crushing some of them, while those in a younger or less advanced state still remain in large masses on the trees

2 A millefolii of Degeer, or yarrow-louse, so named from the plant it selects Small species, colour green, spotted with black males generally winged, and smaller and slenderer than the females

3 A tiliæ, lime-tree-louse One of the most beautiful of the genus size small, like that of a rosæ, colour greenish yellow, with a row of black crescent shaped spots down each side of the abdomen, and a black stripe on each side of the thorax wings beautifully transparent, with brown nerves or veins, a black edging down the shoulder part, and several dusky patches towards the tips

4 A rosæ, rose-louse very frequent in the summer months on the young shoots and buds of roses size that of a salicis, colour bright green, the males furnished with large transparent wings

5 A vitis, common vinefretter almost perpetually found in the summer months on the vitis vinifera Body greenish, back of the abdomen brown and a brown dot between the antennæ This destructive insect eats through the peduncles or stems which support the clusters of grapes in their very early stage, compelling them to wither away and drop off soon after the fruit is formed

APHO'NIA (*aphonia*, *αφωνια*, from *α* priv and *φωνη*, *the voice*) A suppression of the voice, without either syncope or coma A genus of disease in the class locales, and order dyscinesiæ of Cullen When it takes place from a tumour of the fauces, or about the glottis, it is termed aphonia gutturalis, when from a disease of the trachea, aphonia trachealis; and when from a paralysis, or want of nervous energy, aphonia atonica

APHORISM, a maxim, general rule, or principle, of a science, or a brief sentence, comprehending a great deal of matter in a few words The word comes from *αφοριζω*, *I separate*, q d a choice or select sentence

APHORI'STICAL *a* (from *aphorism*) Written in separate and unconnected sentences

APHORI'STICALLY *ad* (from *aphoristical*) In the form of an aphorism (*Harvey*)

APHRODISIA, in antiquity festivals in honour of Venus, celebrated in different parts of Greece, but chiefly in Cyprus They were instituted by Cinyras, and all those that were initiated offered a piece of money to Venus, as a harlot, and received as a mark of the favours of the goddess, a measure of salt and a *φαλλος*

APHRODISI'ACAL, APHRODISI'ACK, *a* (from *Αφροδιτη*, *Venus*) Relating to the venereal disease

APHRODI'SIACS (*aphrodisiaca*, *medicamenta*, *αφροδισιακα*, from *αφροδισια*, *venery*) Medicines which excite a desire for venery, as the meloe vesicatorius of Linneus

APHRODISIUS, in chronology, the eleventh month of the Bythinian year, beginning July 23

APHRODITA In zoology, a genus of the class and order vermes mollusca Body creeping oblong, covered with scales, and furnished with numerous bristly fasciculate feet on each side, mouth terminal, cylindrical, retractile, feelers two, setaceous, annulate, eyes four Nine species, chiefly inhabitants of the European seas Of these the aculeata is often found in the belly of the cod-fish, feeds on testaceous animals, and is from four to seven inches long

APHRODITE, in mythology, a name of Venus, derived from *αφρος*, *froth*, because according to the poets Venus was produced from the froth or foam of the sea

APHROSYNE (from *α* priv and *φρην*, *the mind*) Madness, dotage, absence of reason

A'PHRUS (*αφρος*, from *απο* and *ρεω*, *to flow forth*) Froth, scum scoriæ

APHTHÆ (*aphthæ*, *αφθαι*, from *απτω*, *to inflame*) The thrush A disease to which children are very subject It appears in small white ulcers upon the tongue, gums, and around the mouth and palate It is ranked by Cullen in the class pyrexiæ, and order exanthemata

APHTHARTODOCETÆ, a sect, sworn enemies of the council of Chalcedon The word is derived from *αφθαρτος*, *incorruptible*, and *δοκεω*, *I imagine* and was given them, because they imagined the body of Jesus Christ was incorruptible and impassible, and not capable of death They arose among the Eutychians, and made their first appearance in the year 535

APHYLLANTHES Blue Montpellier pink In botany, a genus of the class and order hexandria monogynia Corol six-petalled filaments inserted in the throat of the corol, capsule superior, glume of the calyx six valved, imbricate The only known species is a native of the south of France

APHYLLOUS, APHYLLUS Leafless, destitute of leaves applied to the stem of a plant, and opposed to foliatus, leafy

APHYTEIA In botany, a genus of the class and order monadelphia pentandria Calyx large, funnel form, three-cleft, petals three, inserted into and shorter than the calyx, germ inferior, berry one celled, many seeded, seeds imbedded The only known species is a Cape vegetable, without leaves, stem, or root, parasitical on the roots of the euphorbia Mauritanica, flowers sessile, coriaceous, succulent, and eaten by the Hottentots

A'PIARY *s* (from *apis*, Lat a bee) The place where bees are kept (*Swift*)

APICES OF A FLOWER Little knobs that grow on the tops of the stamens (*Quincy*)

APICULUM, in antiquity, a fillet worn by the flamens in summer, in lieu of the apex

APIECE ad (*a* and *piece*) To the part or share of each (*Hooker Swift*)

APIEN (Peter), a German astronomer, was born in Misnia, in 1495, and became mathematical professor at Ingolstadt, where he died in 1552 His Cosmography was printed about 1530, after which he published several other learned works He is particularly celebrated as the inventer of a curious instrument, from its figure called folium populi, which, by the sun s rays, shewed the hours in all parts of the earth, and even the unequal hours of the Jews

APIS, one of the ancient kings of Peloponnesus, son of Phoroneus, and descended from Inachus Some say that Apollo was his father, and that he was king of Argos, while others called him king of Sicyon, and fix the time of his reign above 200 years earlier, which is enough to shew he is but obscurely known, if known at all He received divine honours after death, as he had been humane to his subjects The country where he reigned was called Apia, and afterwards Pelasgia, Argia, or Argolis, and at last that of Peloponnesus, from Pelops

APIS, is also a god of the Egyptians, worshipped under the form of an ox Some say that Isis and Osiris are the deities worshipped under this name because during their reign they taught the Egyptians agriculture The Egyptians believed that the soul of Osiris was really departed into the ox, where it wished to dwell because that animal had been of the most essential service in the cultivation of the ground, which Osiris had introduced into Egypt (See OSIRIS) The manner in which this ox was chosen by the Egyptians, and their mode of worshipping it, are amply detailed in Herodotus, Strabo, Pliny, and other ancient writers

APIS Bee A genus of the class and order insecta hymenoptera Mouth horny, jaw and lip membranaceous at the tip tongue inflected, feelers four, unequal, filiform, antennas short, filiform, those of the female subclavate, wings flat, sting of the females and neuters pungent, and concealed in the abdomen See Nat Hist pl XXII

The insects of this genus live, some of them, in large societies, and some are solitary their food is the nectar of flowers, honey and ripe fruit, the larva is soft and without feet, the pupa resembles the perfect insect Two hundred and fifty seven species, scattered over the globe, which are thus arranged by Fabricius

A Tongue three-cleft, lip elongated and trifid Hylæus

B Tongue three-cleft, lip cylindrical, with two membranaceous bristles on each side Andrena

C Tongue three-cleft, hind-feelers tongue-shaped Nomada

D Tongue five-cleft, feelers very short Apis

E Tongue seven-cleft, lip five-cleft. Eucera

We can only notice the following

1 A violacea, hairy black wings violet Inhabits southern Europe, in the trunks of decayed trees, which it perforates longitudinally, and forms numerous nests, in each of which is deposited a single egg, these nests are made of the farina of vegetables, mixt with honey, and are begun from the bottom

2 A mellifica, honey-bee Common-bee Pubescent, thorax greyish, abdomen brown, hind-shanks ciliate, and transversely striate within Inhabits Europe in hollow trees, but is chiefly kept in hives This well-known and active insect lives among large societies, composed of males or drones, females or queens, and neuters or working bees The drone has no sting, nor are its feet or proboscis adapted for collecting honey or wax, its life is a series of idleness and gluttony The queen has very short wings, and is larger than the others after having destroyed all the rest of the females which are in the larva or pupa state, she remains under the care and protection of the working bees, who feed her, and follow her wherever she goes She lays from three to four thousand eggs in the space of about two months, which she deposits in cells adapted to their several kinds When the bees are too numerous for their accommodation in the hive, the queen becomes agitated and communicates this agitation to her subjects she then rushes out, followed by a multitude of working bees who swarm about her, and when she is fatigued and settles on any place, cling round her, and guard her with the greatest care After this swarm is departed, another queen recently transformed from the pupa state, is set at liberty, and soon migrates with a fresh swarm This is repeated four, and sometimes five times in a single summer season, till the hive becomes weakened and then the remaining queens fight among themselves till only one is left

The working-bees are extremely numerous, and to their skill and industry is committed the formation of the cells, and the collection of wax and honey, and the care of providing and administering food to the queen, the males, and the unhatched worms From the nectar of flowers they procure honey, and from the pollen or dust which covers the stamina of many vegetables, they gather wax The former often partakes of the aroma and qualities of the plant from which it is obtained, and hence in several parts of North America it has very often been found poisonous from the lauro-cerasus, or other poisonous plants having furnished the honey, a fact often adverted to by ancient entomologists The wax is brought home in an unwrought state, in hollows under the thighs, and after being eaten and macerated in the stomach, is discharged in small parcels, and moulded by the jaws into perfect wax

These insects defend the entrance of the hive against all intruders with the most determined

resolution; and keep in imprisonment, and under guard, the young queens, till the old one has disappeared with a swarm. If by any accident, their queen has been destroyed or lost, they become inactive and stupid, and readily adopt any other that may accidentally present herself, or enlarge several of the cells containing the eggs of working bees, and give the larvæ issuing from them more abundant nourishment, and of a different quality, by which when they change to flies, they become queens. It is likewise the office of the working bees to destroy all the males when they become useless in regard to propagation, which is done by suddenly attacking them in the autumn with their stings, and casting out their dead bodies. A few females of each hive (few at least comparatively), survive the severity of the winter, and lay the foundation of succeeding progenies and societies. It follows, of course, that a few of the males must be capable of co existing with them. The antennæ of the female have each ten articulations, of the male eleven, of the neuters fifteen.

3. A. centuncularis, carpenter-bee. Black, abdomen covered beneath with fulvous hair. Inhabits Europe, and forms its nest in the body of an oak, and other timber trees, which it bores into, and after removing the dust, and making the cavity perfectly smooth, it lines it curiously with rose-leaves. It then deposits its eggs, each in a separate cell, and leaving a sufficient quantity of food for the larve, closes up the entrance with rose-leaves, cemented by a glue or paste of its own preparing. The larva, after having consumed all its provision, eats its way out, and soon becomes a perfect insect. For the most elaborate details of the organs, habits, and ramifications of this genus the reader may consult Mr. John Hunter's paper in the Phil. Trans. 1792, and Mr. Kirby's Monographia Apium Angliæ.

APIS MUSCA, the bee or fly, in astronomy, a southern constellation, containing two stars of the fourth magnitude, and two of the fifth.

A'PISH. *a.* (from *ape*.) 1. Having the qualities of an ape; imitative (*Shakspeare*). 2. Foppish, affected (*Shakspeare*). 3. Silly, trifling (*Glanville*). 4. Wanton, playful (*Prior*).

A'PISHLY. *ad.* (from *apish*.) In an apish manner, foppishly, conceitedly.

A'PISHNESS. *s.* (from *apish*.) Mimickry, foppery, insignificance, playfulness.

API'TPAT. *ad.* (a word formed from the motion.) With quick palpitation (*Congreve*).

APIUM. Parsley. A genus of the class and order pentandria digynia. Fruit ovate, ribbed; petals inflected, uniform; involucre one-leafed. Three species.

1. A. petroselinum, common parsley. A native of Sardinia, but now of general growth among ourselves, of which there are three varieties.

2. A. graveolens, celery, smallage, largely cultivated, but indigenous to our ditches.

3. A. prostratum, a native of New Holland. In medicine, the roots, seeds, and fresh plant, are all accounted aperient and carminative.

APLUDA. In botany, a genus of the class and order polygamia monœcia. Calyx glume common, two-valved; female floret sessile; male, peduncled. Male calyxless; corol two-valved; stamens three. Female calyxless; corol two-valved; style one; seed one-coated. Four species, natives of the East or West Indies.

APLUSTRE, or AMPLUSTRE, in the ancient naval architecture, a carved tablet, somewhat after the manner of a shield, fixed by way of decoration to the extremity of a ship's head.

APNEUSTIA (απνευστια, from α priv. and πνεω, *to breathe*.) Defect or difficulty of respiration.

APNCEA (απνοια.) The same as APNEUSTIA.

APOBATERION, in antiquity, a farewell speech or poem.

APOBATHRA, in antiquity, temporary bridges for the purpose of passing from the land to ships, or from one ship to another.

APOBOMIOI, in antiquity, sacrifices offered on the earth.

APOCALYPSE, REVELATION, the name of one of the sacred books of the New Testament, including revelations concerning several important doctrines of Christianity. The word is derived from αποκαλυπτω, *to reveal* or *discover*.

This book, according to Irenæus, was written about the year 96 of Christ, in the island of Patmos, whither St. John had been banished by the emperor Domitian. But sir Isaac Newton places the writing of it earlier, viz. in the time of Nero. Some attribute this book to the arch heretic Cerinthus: but the ancients unanimously ascribed it to John the son of Zebedee, and brother of James, whom the Greek fathers call the Divine, by way of eminence, to distinguish him from the other evangelists. This book has not at all times, been esteemed canonical. But archdeacon Woodhouse, in his Dissertation on the divine origin of this book, in answer to the objections of Michaelis, has, we think, set this question pretty well at rest.

The Apocalypse consists of twenty-two chapters. The three first are an instruction to the bishops of the seven churches of Asia Minor. The fifteen following chapters contain the persecutions which the church was to suffer from the Jews, heretics, and Roman emperors. Next, St. John prophesies of the vengeance of God which he will exercise against those persecutors, against the Roman empire, and the city of Rome, which, as the Protestants suppose, he describes under the name of Babylon, the great whore, seated upon seven hills. In the last place, the 19th, 20th, 21st, and 22d chapters, describe the triumph of the church over its enemies, the marriage of the Lamb, and the happiness of the church triumphant.

"It is a part of this prophecy (says sir Isaac Newton), that it should not be understood be-

fore the last age of the world, and therefore it makes for the credit of the prophecy, that it is not yet understood The folly of interpreters has been to foretel times and things by this prophecy, as if God designed to make them prophets By this rashness they have not only exposed themselves, but brought the prophecy also into contempt The design of God was much otherwise he gave this and the prophecies of the Old Testament, not to gratify men's curiosities, by enabling them to foreknow things, but that, after they were fulfilled, they might be interpreted by the events, and his own providence, not the interpreters, be then manifested thereby to the world And there is already so much of the prophecy fulfilled, that as many as will take pains in this study, may see sufficient instances of God's providence

APOCALYPTICAL a (from *apocalypse*) Containing revelation (*Burnet*)

APOCATASTASIS, in astronomy, the period of a planet The word originally denotes the entire restitution of a thing

APOCENOSIS (*apocenosis*, αποκενωσις, from απο, and κενοω, *to evacuate*) A superabundant flux of blood or other fluid without pyrexia The name of an order in the class locales of Cullen

APOCOPE s (αποκοπη) A figure in grammar when the last letter or syllable of a word is taken away as, apoplex, for apoplexy

APOCREMMA (from αποχρεμπτω, *to spit up*) The matter discharged by hawking or spitting up

APOCREMPSIS (from αποχρεμπτω) The act or operation of hawking or spitting up matter

APOCRISIARIUS in antiquity, an officer appointed to carry or deliver the messages, orders, and answers, of a prince or emperor This office was instituted in the time of Constantine, or soon after

APOCRUSTICK a (αποκρουστικα) Endued with a repelling and astringent power

APOCRYPHA, or APOCRYPHAL BOOKS, such as are not admitted into the canon of Scripture, being either not acknowledged as divine, or spurious When the Jews published their sacred books they only gave the appellations of canonical and divine to such as they then made public, and such as were still retained in their archives they called apocryphal, for no other reason, but because they were not public, so that they might be really sacred and divine, though not promulged as such

The Protestants do not only reckon those books to be apocryphal which are esteemed such in the church of Rome, as the prayer of Manasseh king of Judah, the third and fourth books of Esdras, St Barnabas's epistle the book of Hermos, the addition at the end of Job and the 151st Psalm but also Tobit, Judith, Esther, the book of Wisdom, Jesus the son of Sirach, Baruch the prophet, the Song of the Three Children, the history of Susanna, the history of Bel and the Dragon, and the first and second books of Maccabees It is not pretended that these books were received by the Jews, or so much as known to them, None of the writers of the New Testament cite or mention them neither Philo nor Josephus speak of them The Christian church was for some ages an utter stranger to these books Origen, Athanasius, Hilary, Cyril of Jerusalem, and all the orthodox writers, who have given catalogues of the canonical books of Scripture, unanimously concur in rejecting these out of the canon And for the New Testament they are divided in their opinions, whether the Epistle to the Hebrews, the Epistle of St James, and the second Epistle of St Peter, the second and third Epistles of St John, the Epistle of St Jude, and the Revelations, are to be acknowledged as canonical or not The Protestants acknowledge such books of Scripture only to be canonical as were so esteemed to be in the first ages of the church The several Epistles abovementioned, and the book of Revelations, whatever the sentiments of some particular persons are or may have been of them, are allowed by all the reformed churches to be parts of the canon of the New Testament

According to the sixth article of the church of England the Apocryphal books are not to be applied to establish any doctrine, but to be read for example of life, and instruction of manners But we can hardly help doubting whether even this is not a greater honour than the major part of these books deserve for the historical books are rather to be considered as romances than real histories and in the moral books, under semblance of virtue, it is not unusual to find vice and superstitious practices recommended So that it is to be feared the prevailing custom of binding up these books with the genuine and inspired books of Scripture, has a strong tendency to weaken the credit and veneration due to the latter, and puts into the hands of the infidel an additional pretence for treating the whole as the bungling inventions of priests or as "old wives' fables

APOCRYPHALLY ad (from *apocryphal*) Uncertainly not indisputably

APOCRYPHALNESS s (from *apocryphal*) Uncertainty doubtfulness of credit

APOCYESIS (from απο and κυω, *to bring forth*) Parturition

APODALIA, APODALS An order of the Linnéan class pisces, thus ordinarily characterised gills bony, ventral fins none It is from this last feature the name is derived See ZOOLOGY.

APODECTÆ in antiquity ten general receivers appointed by the Athenians to receive the taxes, &c

APODECATI, officer appointed at Athens to see that the measures of corn were just

APODES (from the privative α and πους) A general term to denote things without feet

APODIXIS, in middle age writers, a receipt for money paid Sometimes it denotes a satisfactory proof Hence the term apodicti-

cal, importing a demonstrative proof, or systematical way of teaching

APODOSIS, in rhetoric, makes the third part of a complete exordium, being properly the application, or restriction of the protasis The apodosis is the same with what is otherwise called axiosis, and stands opposed to protasis e g protasis, all branches of history are necessary for a student, catasceue, so that, without these, he can never make any considerable figure, apodosis, but literary history is of a more especial use, which recommends it, &c

APODYTERIUM, in the ancient baths, the apartments where persons dressed and undressed

APOGEE, APOGÆUM, in astronomy, that point in the orbit of the sun, moon, &c which is farthest distant from the earth It is at the extremity of the line of the apsides, and the point opposite to it is called the perigee, where the distance from the earth is the least

The ancient astronomers, considering the earth as the centre of the system, chiefly regarded the apogee and perigee but the moderns, placing the sun in the centre, change these terms for the aphelion and perihelion The apogee of the sun, is the same thing as the aphelion of the earth, and the perigee of the sun is the same as the perihelion of the earth

Motion of the Moon's APOGEE See MOON

APOGRAPH, a copy or transcript of some book or writing The word is formed of απο, *ab, from*, and γραφω, *I write* In this sense, apograph stands opposed to autograph, as a copy to an original

APOGALACTISM (from απο and γαλακτιζω, *to suckle with milk*) Ablactation, or weaning a child from the breast

APOLEPSIS (*apolepsis*, απολειψις, from απο and λαμβανω, *to take from*) An interception, suppression, or retention of urine, or any other natural evacuation

APOLIDES, those divested of the privileges of Roman citizens

APOLLINARIAN GAMES, games at Rome, celebrated yearly in honour of Apollo, on the fifth day of July, under the direction of the prætor, in the Circus maximus They were instituted in the year of Rome 542, and were merely scenical, no chariot races, or other exercises, being performed at them

APOLLINARIANS, APOLLINARISTS, called also by Epiphanius Dimæritæ, ancient heretics, who denied the proper humanity of Christ, and maintained that the body which he assumed was endowed with a sensitive, and not a rational soul, but that the Divine Nature supplied the place of the intellectual principle in man This sect derived its name from Apollinaris, bishop of Laodicea, in the fourth century

APOLLO, in mythology, a pagan deity worshipped by the Greeks and Romans He is the reputed son of Jupiter and Latona, called also Phœbus, is often confounded with the sun According to Cicero, 3 de Nat Deor there were four persons of this name To the son of Jupiter and Latona, however, all the actions of the others seem to have been attributed When Latona was pregnant by Jupiter, Juno, who was ever jealous of her husband's amours, raised the serpent Python to torment Latona, who was refused a place to give birth to her children, till Neptune, moved at the severity of her fate, raised the island of Delos from the bottom of the sea, where Latona brought forth Apollo and Diana As soon as he was born, Apollo destroyed with arrows the serpent Python, which Juno had sent to persecute Latona Hence he was called Pythius Apollo was the god of all the fine arts, of medicine, music, poetry, and eloquence of all which he was deemed the inventor He had received from Jupiter the power of knowing futurity, and he was the only one of the gods whose oracles were in general repute over the world When his son Æsculapius had been killed with the thunders of Jupiter, for raising the dead to life, Apollo, in his resentment, killed the Cyclops who had fabricated the thunderbolts Jupiter was incensed at this act of violence, and he banished Apollo from heaven and deprived him of his dignity The exiled deity came to Admetus, king of Thessaly, and hired himself to be one of his shepherds, in which ignoble employment he remained nine years During his residence in Thessaly he rewarded the tender treatment of Admetus He assisted Neptune in building the walls of Troy, and when he was refused the promised reward by Laomedon, he destroyed the inhabitants by a pestilence Apollo is generally represented with long hair, tall, beardless, with a handsome shape, holding in his hand a bow, and sometimes a lyre, his head is generally surrounded with beams of light He had temples and statues in every country, particularly in Egypt, Greece, and Italy The cock, the grasshopper, the wolf, the crow, the swan, the hawk, the olive, the laurel, the palm-tree, &c were sacred to him, and in his sacrifices, wolves and hawks were offered as they were the natural enemies of the flocks over which he presided Bullocks and lambs were also immolated to him As he presided over poetry, he was often seen on mount Parnassus with the nine Muses His most famous oracles were at Delphi, Delos, Claros, Tenedos, Cyrrha, and Patara His most splendid temple was at Delphi, where every nation and individual made considerable presents when they consulted the oracle He had a famous Colossus in Rhodes, which was one of the seven wonders of the world

APOLLODORUS, a famous grammarian of Athens, who flourished about 104 years before Christ Of all his works, only three books of his Bibliotheca, concerning the original of the gods, are extant, the best edition of which is that of Gale, 1675

APOLLODORUS, a famous architect, was born at Damascus, and lived under Trajan and Adrian He was employed by the former to build the great bridge over the Danube, and other structures His bluntness proved his ruin, for when Adrian sent him the design of a

temple of Venus, which he had just built, the architect found that it was too small for the size of the statues, and said, "that if the goddesses should have a mind to rise and go out, they could not." This provoked the emperor so much, that he banished him, and afterwards caused him to be put to death.

APOLLONIA, a festival at Ægialea in honour of Apollo and Diana. It arose from this circumstance: these two deities came to Ægialea after the conquest of the serpent Python, but they were frightened away, and fled to Crete. Ægialea was soon visited with an epidemical distemper, and the inhabitants, by advice of their prophets, sent seven chosen boys, with the same number of girls, to entreat them to return to Ægialea. Apollo and Diana granted their petition: in honour of which a temple was raised to Πειθω the goddess of persuasion, and ever after, a number of youths of both sexes were chosen to march in solemn procession, as if anxious to bring back Apollo and Diana.

APOLLONIAN (Hyperbola and Parabola). See HYPERBOLA, &c.

APOLLONIUS, of Perga, a city in Pamphilia, was a celebrated geometrician who flourished in the reign of Ptolemy Euergetes, about 240 years before Christ, being about 60 years after Euclid, and 30 years later than Archimedes. He studied a long time in Alexandria under the disciples of Euclid, and afterwards he composed several curious and ingenious geometrical works, of which only his books of Conic Sections are now extant, and even these not perfect. For it appears from the author's dedicatory epistle to Eudemus, a geometrician in Pergamus, that this work consisted of eight books, only seven of which however have come down to us.

From the collections of Pappus, and the Commentaries of Eutocius, it appears that Apollonius was the author of various pieces in geometry, on account of which he acquired the title of the Great Geometrician. His Conics was the principal of them. Some have thought that Apollonius appropriated the writings and discoveries of Archimedes. Heraclius, who wrote the life of Archimedes, affirms it, though Eutocius endeavours to refute him. Although it should be allowed a groundless supposition, that Archimedes was the first who wrote upon conics, notwithstanding his treatise on conics was greatly esteemed, yet it is highly probable that Apollonius would avail himself of the writings of that author, as well as others who had gone before him: and upon the whole, he is allowed the honour of explaining a difficult subject better than had been done before, having made several improvements both in Archimedes's problems, and in Euclid. His work upon conics was doubtless the most perfect of the kind among the ancients, and in some respects among the moderns also. The other writings of Apollonius, mentioned by Pappus, are, 1. The Section of a Ratio, or Proportional Sections, two books. 2. The Section of a Space, in two books. 3. Determinate Section, in two books. 4. The Tangencies, in two books. 5. The Inclinations, in two books. 6. The Plane Loci, in two books. A magnificent edition of the eight books of the Conics was published in folio by Dr Halley at Oxford, in 1710, the eighth being restored by himself.

APOLLONIUS RHODIUS, the author of the Argonautics, was born at Alexandria in Egypt; he taught rhetoric at Rhodes, and hence was called Rhodius. He flourished about the 137th olympiad, and was keeper of the Alexandrian library. Longinus, in his treatise of the Sublime, commends this poet. The ancient scholia upon his Argonautics, still extant, are extremely useful, and full of learning.

APOLOGE'TICAL, APOLOGE'TICK. *a.* That is said in defence of any thing or person (*Boyle*).

APOLOGE'TICALLY. *ad.* (from *apologetical*.) In the way of defence or excuse.

APO'LOGIST. *s.* (from *apologize*.) He that makes an apology.

To APO'LOGIZE. *v. n.* (from *apology*.) To plead in favour of a person or thing (*Pope*).

A'POLOGUE. *s.* (απολογος.) Fable, story contrived to teach some moral truth (*Locke*).

APO'LOGY. *s.* (*apologia*, Lat. ἀπολογια.) Defence, excuse (*Tillotson*).

APOMECO'METRY. *s.* (απο, *from*, μηκος, *distance*, and μετρεω, *to measure*.) The art of measuring things at a distance.

APONEURO'SIS (*aponeurosis*, απονευρωσις, from απο, *from*, and νευρον, *a nerve*, from an erroneous supposition of the ancients, that it was formed by the expansion of a nerve.) A tendinous expansion.

APONOGE'TON. In botany, a genus of the class and order dodecandria tetragynia. Ament composed of scales, calyxless, corolless, capsules from three to four seeded. Four species, natives of India, or the Cape. The white flowers of the a. distachyon (a Cape plant), are highly fragrant: and its bulbs are eaten roasted.

APO'PHASIS. *s.* (Lat. αποφασις.) A figure by which the orator seems to wave what he would plainly insinuate (*Smith*).

APOPHASIS, in ancient law, the account given of estates at the exchange of them, called antidosis.

APOPHLE'GMATICK. *a.* (ἀπὸ and φλεγμα.) Drawing away phlegm.

APOPHLE'GMATICS (from απο and φλεγμα, *phlegm*.) Errhines: medicines which promote the discharge of phlegm from the nostrils.

APOPHLE'GMATISM. *s.* (απο and φλεγμα.) A medicine to draw phlegm (*Bacon*).

APOPHORETA, presents made to the guests at ancient feasts.

APOPHTHEGM, a short, wise, and pithy saying. Such is that of Cyrus: He is unworthy to be a magistrate, who is not better than his subjects. Or that of Artaxerxes Mnemon, when reduced to hunger by the loss of his baggage: How much pleasure have I hitherto lived a stranger to! Or that of Cato, Homines

nihil agendo discunt male agere Or, finally, that of Augustus, Festina lente

APOPHTHORA (from αποφθειρω, to be abortive) An abortion

APOPHYGE, in architecture, a concave part or ring of a column, lying either above or below the flat member Originally this was the ferril fixed on the extremities of wooden pillars to keep them from splitting

APO'PHYSIS In botany, a process or excrescence from the receptacle of mosses

APOPHYSIS (apophysis, αποφυσις from απο and φυω, to grow) In anatomy, a process of a bone, as the nasal apophysis of the frontal bone, &c

APOPLE'CTIC, APOPLE'CTICAL a Relating to an apoplexy

APOPLE'XIA (apoplexia, αποπληξια, from αποπλησσω, to strike or knock down because persons, when seized with this disease, fall down suddenly) Apoplexy A sudden abolition, in some degree, of the powers of sense and motion, with stupor, and sometimes snoring, the respiration and motion of the heart remaining Cullen arranges it in the class neuroses, and order comata When it takes place from a congestion of blood, it is termed apoplexia sanguinea, and when there is an abundance of serum, as in persons of a cold temperament, apoplexia serosa, if it arise from water in the ventricles of the brain, it is called apoplexia hydrocephalica, if from a wound, apoplexia traumatica, if from poisons, apoplexia venenata, if from the action of suffocating exhalations, apoplexia suffocata, if from passions of the mind, apoplexia mentalis, and when joined with catalepsy, apoplexia cataleptica

APOPOMPÆ, in antiquity, certain days on which sacrifices were offered to gods called Pompæ

APOPSYCHIA, in astrology, effluvia pretended to be emitted from the heavenly bodies, and to which their influence is attributed

APORIA, in rhetoric, denotes a state of doubt or wavering, wherein the orator appears undetermined whether to say a thing or not e g Floquar an silcam? Shall I speak out, or hold my tongue?

APORION, or APORIME, a problem difficult to resolve, and which has never been resolved, though it be not, in itself, impossible The word is derived from απορο, which signifies something very difficult, and impracticable, being formed from the privative α and πορος, passage Such we conceive the quadrature of the circle, the duplicature of the cube, the trisection of an angle, &c When a question was proposed to any of the Greek philosophers, especially of the sect of academists, if he could not give a solution, his answer was, απορεω, q d I cannot see through it

APORRHŒ'A (from απο and ρεω, to flow) Contagion miasm from stagnant waters

APOSIOPESIS, in rhetoric, otherwise called reticency, and suppression, a figure, by which a person really speaks of a thing, at the same time that he makes a shew as if he would say nothing of it The word comes from αποσιωπαω, I am silent

APOSPHRAGISMA, in antiquity, the figure, or impression, of a seal It was forbid among many of the ancients to have the image of God on their rings and seals

APOSTASIS, in physic, usually signifies the same with abscess

APO'STASY s (αποστασις) Departure from what a man has professed It is most generally applied to a renunciation of religion The primitive church distinguished several kinds of apostasy The first, of those who went over entirely from Christianity to Judaism the second, of those who mingled Judaism and Christianity together the third, of those who complied so far with the Jews, as to communicate with them in many of their unlawful practices, without making a formal profession of their religion the fourth sort consisted of those, who after having been some time Christians, voluntarily relapsed into paganism

The perversion of a Christian to Judaism, paganism, or other false religion was punished by the emperors Constantius and Julian with confiscation of goods, to which the emperors Theodosius and Valentinian added capital punishment, in case the apostate endeavoured to pervert others to the same iniquity A punishment too severe for any temporal laws to inflict and yet the zeal of our ancestors imported it into this country, for we find by Bracton, that in his time apostates were to be burnt to death Doubtless the preservation of Christianity, as a national religion, is abstracted from its own intrinsic truth, of the utmost consequence to the civil state which a single instance will sufficiently demonstrate The belief of a future state of rewards and punishments, the entertaining just ideas of the moral attributes of the Supreme Being, and a firm persuasion that he superintends and will finally compensate every action in human life (all which are clearly revealed in the doctrines, and forcibly inculcated by the precepts, of our saviour Christ), these are the grand foundation of all judicial oaths, which call God to witness the truth of those facts, which perhaps may be only known to him and the party attesting all moral evidence therefore, all confidence in human veracity, must be weakened by apostasy, and overthrown by total infidelity Wherefore all affronts to Christianity, or endeavours to depreciate its efficacy, in those who have once professed it, are highly deserving of censure But yet the loss of life is a heavier penalty than the offence, taken in a civil light, deserves, and, taken in a spiritual light, our laws have no jurisdiction over it This punishment, therefore, has long ago become obsolete, and the offence of apostasy was for a long time the object only of the ecclesiastical courts, which corrected the offender pro salute animæ But about the close of the last century, the civil liberties to which we were then restored being used as a cloke of mali-

riousness, and the most horrid doctrines subversive of all religion being publicly avowed both in discourse and writings, it was thought necessary again for the civil power to interpose, by not admitting those miscreants to the privileges of society, who maintained such principles as destroyed all moral obligation. To this end it was enacted by statute 9 and 10 W. III. c. 32. That if any person educated in, or having made profession of, the Christian religion, shall by writing, printing, teaching, or advised speaking, deny the Christian religion to be true, or the holy Scriptures to be of divine authority, he shall upon the first offence be rendered incapable to hold any office or place of trust; and, for the second, be rendered incapable of bringing any action, or of being guardian, executor, legatee, or purchaser of land; and shall suffer three years imprisonment without bail. To give room however for repentance, if within four months after the first conviction, the delinquent will in open court publicly renounce his error, he is discharged for that once from all disabilities.

APOSTATE. s. (*apostata*, Lat. ἀποστάτης.) One that has forsaken his profession; one that has left his religion (*Rogers*).

APOSTATICAL. a. (from *apostate*.) After the manner of an apostate (*Sandys*).

To APOSTATIZE. v. n. (from *apostate*.) To forsake one's profession or religion (*Bent.*).

APOSTEMA (*apostema*, ἀπόστημα, from ἀφίστημι, *to recede*.) The term given by the ancients to abscesses in general. See ABSCESS.

To APOSTEMATE. v. n. (from *aposteme*.) To become an aposteme; to swell and corrupt into matter (*Wiseman*).

APOSTEMATION. s. (from *apostemate*.) The formation of an aposteme (*Grew*).

A POSTERIORI. See DEMONSTRATION.

APOSTLE, ἀπόστολος, one of the twelve disciples of Jesus Christ, commissioned by him to preach his gospel, and propagate it to all the parts of the earth. The word originally signifies a person delegated or sent, from ἀποστέλλω, *mitto*, in which sense it occurs in Herodotus, and other profane authors. Hence, in the New Testament, the term is applied to divers sorts of delegates, and to the twelve disciples by way of eminence.

Our blessed Lord selected twelve out of the number of his disciples to be invested with the apostleship. Their names were Simon Peter, Andrew, James the greater, John, Philip, Bartholomew, Thomas, Matthew, James the less, Jude, surnamed Lebbeus or Thaddeus, Simon the Canaanite, and Judas Iscariot. Of these, Simon, Andrew, James the greater, and John, were fishermen, and Matthew a publican, or receiver of the public revenues: of what profession the rest were, we are not told in Scripture, though it is probable they were fishermen.

There are various conjectures as to the reason of our Saviour's making choice of twelve apostles. The most probable is, that it might be an allusion to the twelve patriarchs, as the founders of their several tribes; or to the twelve chief heads or rulers of those tribes, of which the body of the Jewish nation consisted. This opinion seems to be countenanced by what our Saviour tells his apostles, that "when the Son of man shall sit in the throne of his glory, they also shall sit upon twelve thrones judging the twelve tribes of Israel."

St. Paul is frequently called the Apostle, by way of eminence; and the apostle of the Gentiles, by reason his ministry was chiefly made use of for the conversion of the Gentile world, as that of St. Peter was for the Jews, who is therefore stiled the apostle of the circumcision. The several apostles are usually represented with their respective badges or attributes: St. Peter, with the keys; St. Paul, with a sword; St. Andrew, with a cross or saltier; St. James minor, with a fuller's pole; St. John, with a cup, and winged serpent flying from it; St. Bartholomew, with a knife; St. Philip, with a long staff, whose upper end is formed into a cross; St. Thomas, with a lance; St. Matthew, with a hatchet; St. Matthias, with a battle-ax; St. James major, with a pilgrim's staff, and a gourd bottle; St. Simon, with a saw; and St. Jude, with a club.

This appellation was also given to the ordinary travelling ministers of the church. Thus St. Paul, in the Epistle to the Romans, xvi. 7. says, Salute Andronicus and Junia, my kinsmen and fellow-prisoners, who are of note among the apostles.

APOSTLE is used among the Jews for a kind of officer anciently sent into the several parts and provinces in their jurisdiction, by way of visitor or commissary, to see that the laws were duly observed, and to receive the monies collected for the reparation of the temple, and the tribute payable to the Romans.

APOSTLE, in the Greek liturgy, is particularly used for a book containing the epistles of St. Paul, printed in the order wherein they are to be read in churches, through the course of the year. The Apostle of late days has also contained the other canonical epistles, the Acts of the Apostles, and the Revelations.

APOSTLE is also thought by many to have been the original name for bishops, before the denomination bishop was appropriated to their order.

APOSTLES CREED. See CREED, APOSTLES.

APOSTLESHIP. s. (from *apostle*.) The office or dignity of an apostle (*Locke*).

APOSTO'LICAL, APOSTO'LICK. a. (from *apostolick*.) Delivered or taught by the apostles (*Hooker. Dryden*).

APOSTOLICAL FATHERS is an appellation usually given to the writers of the first century who employed their pens in the cause of Christianity.

APOSTO'LICALLY. ad. (from *apostolical*.) In the manner of the apostles.

APOSTOLICI, or APOSTOLICS, was a name assumed by three different sects, on account of their pretending to imitate the manner and practice of the apostles.

APOSTOLICUM, is a peculiar name given to a kind of song or hymn, anciently used in churches. Vossius understands it as spoken of the apostles' creed. Suicer thinks this impossible, for that this creed was then unknown in the churches of the east.

APOSTOOLIANS, a sect of the Mennonites, which first sprung up in the year 1664, and derived its name from Apostool, one of the Mennonite ministers at Amsterdam. They concurred with them in doctrine, and admitted to their communion those only who professed to believe all the sentiments which are contained in their public confession of faith.

APOSTROPHE, in rhetoric, a figure, whereby the orator, in an extraordinary commotion, turns his discourse from the audience, and directs it to some other person, present or absent, living or dead, or to inanimate nature. The word is formed of απο, *ab, from*, and στρεφω, *verto, to turn*. Thus Cicero, in his oration for Milo, addresses himself to the great patriots who had shed their blood for the public, and calls them to the defence of his client. So the same orator, in his first Catilinarian, directs himself to Jupiter the protector of the city and empire, and beseeches him to repel the parricide, &c.

The poems of Ossian abound with beautiful instances of this figure.

"Weep on the rocks of roaring winds, O maid of Inistore! Bend thy fair head over the waves, thou fairer than the ghost of the hills when it moves in a sunbeam at noon over the silence of Morven! He is fallen! Thy youth is low, pale beneath the sword of Cuchullin!"

Apostrophe, or **Apostrophus**, in grammar, also denotes a note or character placed over a letter, in lieu of a vowel, to denote that the vowel is cut off, and not to be pronounced. As ev'n for even, th' angelic host, for the angelic, &c. The affectation of frequent apostrophes, so usual among some late English writers, is a great abuse. In prose, apostrophes are indefensible, and tend to vitiate the language; their use in poetry is to reduce a line to the proper measure.

To **APOSTROPHIZE**. *v. a.* To address by an apostrophe.

APOTACTITÆ, or **Apotactici**, an ancient sect, who, affecting to follow the evangelical counsels of poverty, and the examples of the apostles, and primitive Christians, renounced all their effects and possessions. The word is formed from αποτασσω, or αποτακτω, *to renounce*.

APOTHE'CA (αποθηκη, from αποτιθημι.) A shop or repository where medicines are prepared or sold.

APO'THECARY. *s.* (*apotheca*, Lat. a repository.) One who practises the art of pharmacy, or prepares and sells medicines. There are in this profession various degrees, as to employ and extent. Some do little more than make up medicines, according to the prescription of the Dispensatory compiled by the order of the college of physicians, for their direction; and of those of particular physicians, besides visiting their patients. Others not only prepare almost all kinds of medicines, as well galenical as chemical, but likewise deal in drugs, with all which they supply their brethren in trade, and so become a sort of wholesale dealers, as well as apothecaries. Others again, practise surgery, manmidwifery, and many times even officiate as physicians, especially in the country, and often become men of very large practice, and eminent in their way.

In London, they are one of the city companies, and were first incorporated with the grocers in 1606, in the reign of king James I. but not alone till 1617. They have a hall where there are two fine elaboratories, out of which all the surgeons chests are supplied with medicines for the use of the British navy.

In the year 1712, the 10th of queen Anne, an act passed for reviving and continuing several acts therein mentioned, one whereof was for exempting the apothecaries from serving the offices of constables and scavengers, and other parish and ward offices, and from serving upon juries, which act was made perpetual in the 9th year of king George I. The apothecaries in England are obliged to make up their medicines according to the formulas prescribed in the Dispensatory of the college of physicians, and are under an obligation to have medicines there enumerated always ready in their shops, and their shops are liable to be visited by the censors of the college, who have it in their power to destroy such medicines as they judge not to be good.

Among the good regulations made in Denmark, that which the apothecaries are obliged to observe is reckoned one of the best: for no person can have leave to follow that profession, unless he be approved of by the college of physicians, and confirmed by the king himself. There are but two apothecaries allowed for the city of Copenhagen, and but one in every other considerable town. The magistrates, attended by the doctors of physic, visit their shops and drugs twice or thrice a year, and those drugs that are either stale or bad are seized, and publicly thrown upon a dunghill without the city, and this is a stain upon the character of such apothecary, that is hardly ever wiped off. The price of all drugs is fixed, so that one may, without fear of being imposed upon, send even a child for any drug to an apothecary's shop, where nothing is sold but what is very good, and at a reasonable price. All drugs are sold for ready money, and yet the apothecaries are obliged to register in a book what they sell, to whom, and by what physician's prescription: so that there seldom happens any accident by poison, either accidentally, or with design, and if any such thing happens, it is easily found out, and quickly punished.

APOTELESMA, denotes generally an effect of some cause. Astrologers use it for influences, and their answers deduced from the stars, are called apotelesmata, the art of astrology itself being called apotelesmatica.

APOTHEOSIS, in antiquity, a heathen ceremony, whereby their emperors and great men were placed among the gods It was one of the doctrines of Pythagoras, which he had borrowed from the Chaldees, that virtuous persons, after their death, were raised into the order of the gods And hence the ancients deified all the inventors of things useful to mankind, and who had done any important service to the commonwealth Tiberius proposed to the Roman senate the apotheosis of Jesus Christ, as is related by Eusebius, Tertullian, and St Chrysostom Juvenal rallying the frequent apotheoses, introduces poor Atlas complaining that he was ready to sink under the prodigious burthen of so many new gods as were almost every day added to the heavens

Herodotus, lib iv gives a minute description of the ceremonies made use of in the apotheosis of the Roman emperor Servius In general the apotheosis was subsequent to the death of the person deified, but Augustus, and even Tiberius and Nero were deified during their lives One of the court poets of Augustus speaks of his master s divinity in these terms

—Presens divus habebitur
Augustus adjectis Britannis
Imperio

APOTHERAPIA, in ancient gymnastics, the friction or rubbing with oil, before and after bathing

APOTHERMUM, in ancient writers, a sauce prepared of vinegar, mustard, &c

APOTOME, in mathematics, the remainder or difference between two lines or quantities which are only commensurable in power Such is the difference between 1 and $\sqrt{2}$, or the difference between the side of the square and its diagonal The word is derived from αποτεμνω, I cut off It is used by Euclid, and a pretty full explanation of such quantities is given in the 10th book of his Elements, where he distinguishes six kinds of apotomes, and shews how to find them all geometrically

Apotome Prima, is when the greater term is rational, and the difference of the squares of the two is a square number, as the difference $3 - \sqrt{5}$

Apotome Secunda, is when the less number is rational, and the square root of the difference of the squares of the two terms, has to the greater term, a ratio expressible in numbers, such is $\sqrt{18} - 4$, because the difference of the squares 18 and 16 is 2, and $\sqrt{2}$ is to $\sqrt{18}$ as $\sqrt{1}$ to $\sqrt{9}$ or as 1 to 3

Apotome Tertia, is when both the terms are irrational, and, as in the second, the square root of the difference of their squares, has to the greater term, a rational ratio as $\sqrt{24} - \sqrt{18}$, for the difference of their squares 24 and 18 is 6, and $\sqrt{6}$ is to $\sqrt{24}$ as $\sqrt{1}$ to $\sqrt{4}$ or as 1 to 2

Apotome Quarta, is when the greater term is a rational number, and the square root of the difference of the squares of the two terms, has not a rational ratio to it as $4 - \sqrt{3}$, where the difference of the squares 16 and 3 is 13, and $\sqrt{13}$ has not a ratio in numbers to 4

Apotome Quinta, is when the less term is a rational number, and the square root of the difference of the squares of the two, has not a rational ratio to the greater as $\sqrt{6} - 2$, where the difference of the squares 6 and 4 is 2, and $\sqrt{2}$ to $\sqrt{6}$ or $\sqrt{1}$ to $\sqrt{3}$ or 1 to $\sqrt{3}$ is not a rational ratio

Apotome Sexta, is where both terms are irrational, and the square root of the difference of their squares has not a rational ratio to the greater as $\sqrt{6} - \sqrt{2}$, where the difference of the squares 6 and 2 is 4, and $\sqrt{4}$ to $\sqrt{6}$ or 2 to $\sqrt{6}$, is not a rational ratio

APOTOME, in music, that portion of a tone-major which remains after deducting from it an interval less, by a comma, than a semitone-major The ancients called other intervals also by this name The little interval which Rameau terms the enharmonic quarter of a tone, they knew by the appellation of apotome major And a certain interval still less than this they denominated apotome minor The former of these intervals was expressed by the ratio $\frac{125}{128}$ the latter by $\frac{2025}{2048}$

The doctrine of apotomes, in lines, as delivered by Euclid in the tenth book, is a very curious subject, and has always been much admired and cultivated by all mathematicians who have rightly understood this part of the Elements, and therefore Peter Ramus has greatly exposed his judgment by censuring that book And the first algebraical writers in Europe commonly employed a considerable portion of their works on an algebraical exposition of that book, which led them to the doctrine of surd quantities, as Lucas de Burgo, Cardan, Tartalea, Stifelius, Peletarius, &c. &c See also Pappus, lib 4, prop 3, and the introduction to lib 7, and Dr Wallis s Algebra, p 109 Hutton s Math Dict

A POZEM (*apozema*, αποζημα, from αποζεω, *to boil*) A decoction

To APPA'L *v a* (*appalir*, Fr) To fright, to depress (*Clarendon*)

APPA'LEMENT *s* (from *appal*) Depression, impression of fear (*Bacon*)

A'PPANAGE *s* (*appanagium*, low Lat) Lands set apart for the maintenance of younger children (*Swift*)

APPARATION, in astronomy, is applied to a star or other luminary, on its becoming visible, after it had been hid, or in a state of occultation

APPARA'TUS *s* (Latin) Tools, furniture, equipage, show (*Pope*)

APPA'REL *s* (*appareil*, Fr) 1 Dress; vesture (*Shakspeare*) 2 External habiliments (*Tatler*)

To APPA'REL *v n* (from the noún) 1. To dress, to clothe (*Samuel*) 2 To cover or deck (*Bentley*)

APPA'RENT *a* (*apparent*, Fr) 1 Plain; indubitable (*Hooker*) 2 Seeming, not real (*Hale*) 3 Visible, not secret (*Atterbury*) 4 Open, evident (*Shakspeare*) 5 Certain; not presumptive (*Shakspeare*)

The apparent state of things (in the third sense of the word) is frequently very different

from their real state, either as to distance, figure, &c &c.

Apparent conjunction of the planets, is when a right line, supposed to be drawn through their centres, passes through the eye of the spectator, and not through the centre of the earth —And, in general, the apparent conjunction of any objects, is when they appear or are placed in the same right line with the eye

Apparent Diameter of an object, is not the real length of that diameter, but the angle which it subtends at the eye, or under which it appears This angle diminishes as the distance increases, so that a small object at a small distance may have the same apparent diameter as a much larger object at a greater distance provided they subtend the same or equal angles at the eye If the objects are parallel to each other, their real diameters are, in this case, proportional to their distances The apparent diameter also varies with the position of the object, and of equal objects at equal distances, those which stand in a position most nearly perpendicular to the line of their direction from the observer, will appear to have the greatest diameter our idea of the apparent magnitude generally varying nearly as the optic angle

But although the optic angle be the usual or sensible measure of the apparent magnitude of an object, yet habit, and the frequent experience of looking at distant objects, by which we know that they are larger than they appear, has so far prevailed upon the imagination and judgment, as to cause this too to have some share in our estimation of apparent magnitudes, so that these will be judged to be more than in the ratio of the optic angles See APPARENT MAGNITUDE

Apparent Distance See DISTANCE

Apparent Altitude of celestial objects is effected chiefly by REFRACTION and PARALLAX, and that of terrestrial objects by refraction see those words

Apparent Figure, is the figure or shape which an object appears under when viewed at a distance, and is often very different from the true figure For a straight line, viewed at a distance, may appear but as a point, a surface, as a line, and a solid, as a surface Also these may appear of different magnitudes, and the surface and solid of different figures, according to their situation with respect to the eye thus, the arch of a circle may appear a straight line, a square, a trapezium, or even a triangle, a circle, an ellipsis, angular magnitudes, round, and a sphere, a circle Also all objects have a tendency to roundness and smoothness, or appear less angular, as their distance is greater for, as the distance is increased, the smaller angles and asperities first disappear, by subtending a less angle than one minute; after these, the next larger disappear, for the same reason, and so on continually, as the distance is more and more increased; the object seeming still more and more round and smooth. So, a triangle, or square, at a great distance appears only as a round speck, and the edge of the moon appears round to the eye, notwithstanding the hills and valleys on her surface And hence it is also, that near objects, as a range of lamps, and such like, seen at a great distance, appear to be contiguous, and to form one uniform continued magnitude by the intervals between them disappearing, from the smallness of the angles subtended by them

Apparent Motion, is either that motion which we perceive in a distant body that moves, the eye at the same time being either in motion or at rest, or that motion which an object at rest seems to have, while the eye itself only is in motion

The motions of bodies at a great distance, though really moving equally, or passing over equal spaces in equal times, may appear to be very unequal and irregular to the eye, which can only judge of them by the mutation of the angle at the eye And motions, to be equally visible, or appear equal, must be directly proportional to the distances of the objects moving Again, very swift motions, as those of the luminaries, may not appear to be any motions at all, but like that of the hour-hand of a clock, on account of the great distance of the objects and this will always happen, when the space actually passed over in one second of time, is less than about the 14000th part of its distance from the eye, for the hour hand of a clock, and the stars about the earth, move at the rate of 15 seconds of a degree in one second of time, which is only the 13751 part of the radius or distance from the eye On the other hand, it is possible for the motion of a body to be so swift, as not to appear any motion at all, as when through the whole space it describes there constantly appears a continued surface or solid as it were generated by the motion of the object, like as when any thing is whirled very swiftly round, describing a ring, &c

Also, the more oblique the eye is to the line which a distant body moves in, the more will the apparent motion differ from the true one So, if a body revolve with an equable motion in the circumference of the circle ABCD, &c and the eye be at E in the plane of the circle, (fig 3 pl 5) as the body moves from A to B and C, it seems to move slower and slower along the line AIK, till when the body arrives at C, it appears at rest at K, then while it really moves from C by D to F, it appears to move quicker and quicker from K by L to A, where its motion is quickest of all, after this it appears to move slower and slower from A to N while the body moves from F to H there becoming stationary again, it appears to return from N to A in the straight line, while it really moves from H by I to A in the circle And thus it appears to move in the line KN by a motion continually varying between the least, or nothing, at the extremes K and N, and the greatest of all at the middle point A Or, if the motion be referred to the concave side of the circle, instead of the line KN, the appearances will be the same All this is manifestly referable to the motions, stations, retrogradations, &c. of the planets.

If an eye move directly forwards in one direction, any remote object at rest will appear to move in a parallel line the contrary way But if the object move the same way and with equal velocity, it will seem to be at rest If it move the same way with less velocity, it will appear to move backwards with the difference of the velocities if it move with greater velocity, it will appear to move forwards with the difference of the velocities And when the object has a real motion contrary to that of the eye, it appears to move backwards with the sum of the velocities The truth of all this is experienced by persons in a boat moving on water, or in a moving carriage, making observations on distant objects in motion, or at rest

On the subject of this article, see O Gregory's Astron ch IX

Apparent Place of an object, in optics, is that in which it appears, when seen in or through glass, water, or other reflecting, or refracting media In most cases it differs much from the true place

Apparent Station, in astronomy, the position or appearance of a planet, or comet, in the same point of the zodiac for several days

If the earth were in the centre of the orbits of the planets, their motions would always be found nearly regular, and we should never observe either stations or retrogradations But since the situation of an observer on the earth is far from the centre of their orbits, they do not always appear to go forwards, or in consequentia but they seem to stand still for a time, after which their motions become retrograde, or in antecedentia Supposing the earth and planets to move in concentric circles in the same plane, the problem respecting their stations would admit of any easy solution, as will appear from the following considerations

Let C (fig 4 pl 5) be the sun in the centre of the orbits, and let the planets be found in the points B and H of the circumferences when the one appears stationary to the other Draw CB and CH, and letting fall the perpendicular CM upon BH, produced if need be, let HP be drawn through the point H parallel thereto, meeting the radius CB in P, from which point, as also from the point O, let PR and OQ be drawn parallel to the line BH, which being done, since the right line *bh* connecting the extremities of the infinitely small arches B*b*, H*h*, described by the planets in the same time, is parallel to BH, the small right lines $l\beta$ and $h\phi$, drawn through *b* and *h*, will be parallel to MC, and equal to each other and besides, because the triangles $Bb\beta$, CBM, and COQ are similar, it will be B*b* $b\beta$ CO OQ, and the similar triangles $Hh\phi$ and HCM give $h\phi$ or $b\beta$ H*h* HM or PR HC or OC, therefore, *ex æquo perturbate*, B*b* H*h* PR OQ Now the small arches B*b*, H*h* described in the same time, are as the velocities with which they are run over, therefore $\frac{PR}{OQ}$, or $\frac{PC}{OC}$ is equal to the quotient of the velocity of the planet B divided by that of the planet H. hence, putting this ratio of the velocities as 1 to *n*, it is only necessary to divide the radius OC in P, so that the part PC may be to the whole OC, as 1 to *n*, and bisecting the remainder BP in S, from this centre with the distance SP, or SB, let the circle BHP be described, it will cut the inferior orbit OY in the desired point H

The angles in the triangle BCH may be easily found by plane trigonometry, for, because the radii BC, OC, are given, a part thereof $\frac{OC}{n}$, which is PC, will be given, and consequently PB, and its half SP or SH therefore, in the triangle SCH there are given three sides, namely, $SC = \frac{BC+PC}{2}$, SH or $SP = \frac{BC-PC}{2}$, and $CH = OC$, whence, we may readily find SCH, and CSH, or its half CBH, from which may also be found the third CHB, or its supplement CHM to two right angles See also STATIONARY

APPA'RENTLY *ad* (from *apparent*) Evidently, openly (*Tillotson*)

APPARITION (Circle of perpetual) See CIRCLE OF PERPETUAL APPARITION

APPARITION, in a general sense, denotes simply the appearance of a thing In a more limited sense, it is used for a spectre or ghost —Several instances of apparitions occur in the Bible, that of Samuel, raised by the witch of Endor, has occasioned great disputes

Mr Andrew Baxter, in his Essay on the Phænomenon of Dreaming, recurs to the principle "that our dreams are prompted by separate immaterial beings, in order to account for apparitions If the power of such beings be unrestrained, this author maintains that it will equally possess the fancy with delusive scenes without waiting for the occasion of sleep to introduce them, and intrude them forcibly upon the organ amidst the action of external objects For it requires but a greater degree of the same power to make delusory impressions upon the sensory, while real external objects are making true impressions upon it, than it would require to make the same impressions while no other impression from external objects is made upon it at the same time Mr Baxter cites the apparition which was presented to Brutus before he came over from Asia, and again the night before the battle of Philippi, the noise as of one entering into his tent which he heard, and the words spoken, "I am, O Brutus, thy evil genius, but thou shalt see me again near Philippi" —The case of Dion, related by Plutarch, is alleged to the same purpose he was sitting in the porch of his own house in a thoughtful and meditating attitude, when the spectre appeared to him, and this happened while the assassins were contriving his death, a little before he was cruelly murdered No men in antiquity could be less liable to the suspicion of weakness and credulity than Brutus and Dion, and therefore, according to Mr Baxter, the terror they experienced must have proceeded from

the power of some superior being Upon the whole he thinks that although Δεισιδαιμονία, or a fear of spirits, hath been much abused by vain or weak people, and carried to an extreme perhaps, by crafty and designing men, the most rigorous philosophy will not justify its being entirely rejected It is true, he adds, no evil can happen to us in God's world, but by our own fault, but that subordinate beings are never permitted or commissioned to be the ministers of his will, is a hard point to be proved See the Essay abovementioned in this very acute author's Inquiry into the Nature of the Human Soul, vol ii

APPARITOR, among the Romans, a general term to comprehend all attendants of judges and magistrates appointed to receive and execute their orders Apparitor, in England, is a messenger that serves the process of a spiritual court, or a beadle in a university who carries the mace

APPAUMEE, in heraldry, denotes one hand extended, with the full palm appearing, and the thumb and fingers at full length

To APPA'Y *v a* (*appayer*, old Fr) To satisfy, to content obsolete (*Milton*)

To APPE'ACH *v a* 1 To accuse, to inform against (*Bacon*) 2 To censure, to reproach (*Dryden*)

APPE'ACHMENT *s* An information made against a person, an accusation

APPEAL, in law, the removal of a cause from an inferior to a superior court or judge, when a person thinks himself aggrieved by the sentence of the inferior judge Appeals lie from all the ordinary courts of justice to the House of Lords In ecclesiastical cases, if an appeal is brought before a bishop, it may be removed to the archbishop, if before an archdeacon, to the court of arches, and thence to the archbishop and from the archbishop s court to the king in chancery

Appeal, in common law, denotes an accusation by a private subject against another for some heinous crime, demanding punishment on account of the particular injury suffered, rather than for the offence against the public —This private process, for the punishment of public crimes, had probably its original in those times, when a private pecuniary satisfaction, called a weregild, was constantly paid to the party injured, or his relations, to expiate enormous offences But the only appeals now in force for things done within the realm, are appeals of felony and mayhem

An appeal of felony may be brought for crimes committed either against the parties themselves or their relations The crimes against the parties themselves are larceny, rape, and arson And for these, as well as for mayhem, the persons robbed, ravished, maimed, or whose houses are burnt, may institute this private process The only crime against one's relation, for which an appeal can be brought, is that of killing him, by either murder or manslaughter But this cannot be brought by every relation, but only by the wife for the death of her husband, or by the heir-male for the death of his ancestor, which heirship was also confined by an ordinance of Henry I to the four nearest degrees of blood It is given to the wife on account of the loss of her husband, therefore, if she marry again, before or pending her appeal, it is lost and gone, or, if she marry after judgment, she shall not demand execution The heir, as was said, must also be heir-male, and such a one as was the next heir by the course of the common law at the time of the killing of the ancestor But this rule has three exceptions 1 If the person killed leaves an innocent wife, she only, and not the heir, shall have the appeal 2 If there be no wife, and the heir be accused of the murder, the person, who next to him would have been heir-male, shall bring the appeal 3 If the wife kill her husband, the heir may appeal her of the death And, by the statute of Gloucester, 6 Ed I c 9 all appeals of death must be sued within a year and a day after the completion of the felony by the death of the party, which seems to be only declaratory of the old common law

These appeals may be brought previous to any indictment and if the appellee be acquitted thereon, he cannot be afterwards indicted for the same offence For more on the subject of appeal, the reader may consult that article in Tomlins s edition of Jacob s Law Dictionary

To APPE'AR *v n* (*appareo*, Latin) 1 To be in sight to be visible (*Prior*) 2 To become visible as a spirit (*Acts*) 3 To stand in the presence of another, generally of some superiour (*Psalms*) 4 To be the object of observation (*Psalms*) 5 To exhibit one s self before a court (*Shak*) 6 To be made clear by evidence (*Spenser*) 7 To seem, in opposition to reality (*Sidney*) 8 To be plain beyond dispute (*Arbuthnot*)

APPE'ARANCE *s* (from *To appear*) 1 The act of coming into sight 2 The thing seen 3 Phænomenon, any thing visible (*Glanv*) 4 Semblance, not reality (*Dry*) 5 Outside, show (*Rogers*) 6 Entry into a place or company (*Addison*) 7 Apparition, supernatural visibility (*Add*) 8 Exhibition of the person to a court (*Shak*) 9 Open circumstance of a case (*Swift*) 10 Presence mien (*Addison*) 11 Probability, likelihood (*Bacon*)

APPE'ARER *s* (from *To appear*) The person that appears (*Brown*)

APPE'ASABLE *a* (from *appease*) That may be pacified, reconcileable

APPE'ASABLENESS *s* (from *appease*) Reconcileableness

To APPE'ASE *v a* (*appaiser*, Fr) 1 To quiet, to put in a state of peace 2 To pacify, to reconcile (*Milton*)

APPE'ASEMENT *s* (from *appease*) A state of peace (*Hayward*)

APPE'ASER *s* (from *appease*) He that pacifies he that quiets disturbances

APPE'LLANT *s* (*appello*, Lat to call) 1 A challenger (*Shak*) 2 One that appeals from a lower to a higher power (*Ayliffe*)

APPELLANTS, in church history, an appellation given to such of the catholic clergy as appeal from the constitution Unigenitus to a general council

APPE'LLATE *s* (*appellatus*, Lat) The person appealed against (*Ayliffe*)

APPELLA'TION *s* (*appellatio*, Latin) Name, word by which any thing is called (*Brown*)

APPELLATIVE NAMES, in grammar, in contradistinction to proper names, are such as stand for universal ideas, or a whole rank of beings, whether general or special Thus fish, bird, man, city, river, are common or appellative names, and so are trout, eel, lobster, for they all agree to many individuals, and some to many species

APPE'LLATIVELY *ad* (from *appellative*) According to the manner of nouns appellative

APPE'LLATORY *a* (from *appeal*) That contains an appeal

APPELLEE' *s* One who is appealed against, and accused

To APPE'ND *v n* (*appendo*, Lat) 1 To hang any thing upon another 2 To add to something as an accessory part

APPE'NDAGE *s* (French) Something added to another thing, without being necessary to its essence (*Taylor*)

APPE'NDANT *a* (Fr) 1 Hanging to something else 2 Belonging to, annexed (*Rogers*)

Appe'ndant *s* That which belongs to another thing (*Grew*)

To APPE'NDICATE *v a* (*appendo*, Lat) To add to another thing (*Hale*)

APPENDICA'TION *s* (from *appendicate*) Adjunct, appendage, annexion (*Hale*)

APPENDI'CULA CÆCI VERMIFORMIS A vermicular process, about four inches in length, and the size of a goose quill, which hangs to the intestinum cæcum of the human body

APPENDICULÆ EPIPLOICÆ Appendices coli adiposæ The small appendices of the colon and rectum, which are filled with adipose substance See Intestines

APPENDI'CULATE, Appendicled, or Appendaged (*appendiculatus*) Ramentis foliaceis ad basin This term in botany is applied to a petiole, when it has a small leaf or leaves at the base

APPE'NDIX *s* Appendices, plural (Lat) 1 Something appended or added (*Stillingfleet*) 2 An adjunct or concomitant (*Watts*)

The term is chiefly used in matters of literature, for an additional discourse, placed at the end of any piece, or writing, to explain or prosecute something there left deficient, or to draw conclusions therefrom —In which sense the word coincides with supplement

APPENINES, a great chain of mountains which almost divide Italy into two equal parts, running through the whole country, from Savona, in Geneva, to the southern extremity of the kingdom of Naples

APPENZEL, the capital of a canton of the same name in Switzerland It is divided into twelve communities, six of which are Roman Catholics, and six Protestants Lat 47 21 N Lon 9 31 E

APPERCEPTION, or Adpperception, a term used by the Leibnitzians for consciousness

To APPERTA'IN *v n* (*appartenir*, Fr) 1 To belong to as of right (*Raleigh*) 2 To belong to by nature (*Bacon*)

APPERTA'INMENT *s* (from *appertain*) That which belongs to any rank or dignity (*Shakspeare*)

APPE'RTENANCE *s* (*appartenance*, Fr) That which belongs to another thing (*Brown*)

APPE'RTINENT *a* (from *To appertain*) Belonging, relating (*Shakspeare*)

A'PPETENCE, A'ppetency *s* (*appetentia*, Lat) Carnal desire (*Milton*)

APPETIBI'LITY *s* (from *appetible*) The quality of being desirable (*Bramhall*)

A'PPETIBLE *a* (*appetibilis*, Lat) Desirable, that may be the object of appetite (*Bramhall*)

APPETITE, in a general sense, the desire of enjoying some object, supposed to be conducive to our happiness When this inclination is guided by reason, and proportioned to the intrinsic value of the object, it is called rational appetite, as on the other hand, it is denominated sensitive appetite, when we have only a blind propensity to a thing, without determinate ideas of the good qualities for which we desire it

Appetites are passions directed to general objects, in contra-distinction to passions directed to particular objects, which retain their proper name Thus we say, an appetite for fame, for glory, for conquest, for riches, but we say the passion of love, of gratitude, of envy, &c Appetite may be also distinguished from passion, since the latter has no existence till a proper object be presented, whereas the former exists first, and then is directed to an object

Appetite, in medicine, a certain uneasy sensation excited in the stomach by the calls of hunger An excessive appetite has been called by physicians bulimy or fames canina, a defect or loss of it, anorexy, and that after things improper for food, pica

APPETI'TION *s* (*appetitio*, Lat) Desire (*Hammond*)

A'PPETITIVE *a* That does desire (*Hale*)

APPIAN WAY, a road reaching from Rome, through Capua, to Brundusium, being nearly 350 miles long This way was paved by Appius Claudius

To APPLA'UD *v a* (*applaudo*, Lat) 1 To praise by clapping the hands (*Shakspeare*) 2 To praise in general (*Pope*)

APPLA'UDER *s* (from *applaud*) He that praises or commends (*Glanville*)

APPLAUSE *s* (*applausus*, Lat) Approbation loudly expressed, praise It originally denoted that kind of approbation which

was signified by clapping the hands, still practised in theatres Applause, in antiquity, differed from acclamation, as the latter was articulate and performed with the voice, the former with the hands Among the Romans, applause was an artificial musical kind of noise, made by the audience or spectators, to express their satisfaction There were three species of applause, denominated from the different noises made in them, viz bombus, imbrices, and testæ, the first a confused din, made either by the hands or the mouth, the second and third, by beating on a sort of sounding vessels placed in the theatres for this purpose Persons were instructed to give applause with skill, and there were even masters who professed to teach the art At the end of the play, a loud peal of applause was expected, and even asked of the audience, either by the chorus or the person who spoke last

APPLE See PYRIS
APPLE, *Adam's* See CITRUS
APPLE, *Blad* See CACTUS
APPLE, *Custard* See ANNONA
APPLE, *Love* See SOLANUM
APPLE, *Mad* See SOLANUM
APPLE, *Male Balsam* See MOMORDICA
APPLE, *May* See PODOPHYLLUM
APPLE, *Pine* See BROMELIA
APPLE, *Purple* See ANNONA
APPLE, *Soap* See SAPINDUS
APPLE, *Sour* See ANNONA
APPLE, *Star* See CHRYSOPHYLLUM
APPLE, *Sugar* See ANNONA
APPLE, *Sweet* See ANNONA
APPLE, *Thorn* See DATURA
APPLE, *Water* See ANNONA

APPLEBY, the county town of Westmoreland, having a good corn market on Mondays Lat 54° 34′ N Long 2° 34′ W This town contains 1300 inhabitants

APPLIABLE *a* (from *apply*) That may be applied, applicable (*South*)

APPLIANCE *s* (from *apply*) The act of applying, the thing applied (*Shakspeare*)

APPLICABILITY *s* (from *applicable*) The quality of being fit to be applied (*Digby*)

APPLICABLE *a* (from *apply*) That may be applied, as properly relating to something (*Dryden*)

APPLICABLENESS *s* (from *applicable*). Fitness to be applied (*Boyle*)

APPLICABLY *ad* (from *applicable*) In such a manner as that it may be properly applied.

APPLICATE, APPLICATA, ORDINATE APPLICATE, in geometry, is a right line drawn to a curve, and bisected by its diameter This is otherwise called an ORDINATE, which see

APPLICATE NUMBER See CONCRETE

APPLICATION *s* (from *apply*) 1 The act of applying any thing to another, 2 The thing applied 3 The act of applying to any person (*Swift*), 4 The employment of means for a certain end (*Locke*) 5 Intenseness of thought; close study (*Locke*) 6 Attention to some particular affair (*Addison*) 7. Reference to some case or position (*Rog*)

Some of these senses of the word are enlarged upon in the next succeeding articles

APPLICATION, the act of applying one thing to another, either by bringing them nearer together, as in measuring a longer space by the application of a less, or, by shewing the use that is made of one thing in perfecting another, as of the cycloid in improving the doctrine of pendulums

APPLICATION, in geometry, is used either for division, for applying one quantity to another, whose areas, but not figures, shall be the same, or, for transferring a given line into a circle, or other figure, so that its end shall be in the perimeter of the figure

APPLICATION of one science to another, is the use made of the principles of the one in perfecting the other as in the application of algebra and geometry to mechanics, of mechanics to geometry, of geometry and astronomy to geography, of geometry and algebra to natural philosophy Instances of these applications will often occur in this work We may here mention the

Application of algebra to geometry, which is of two kinds, that which regards the plane, or common geometry, and that which respects the geometry of curves In these applications a line whether known or unknown, may be represented by a single letter a rectangle by the product of the two letters representing its sides, and a rectangular parallelopiped by the product of three letters, two of which represent the sides of any of its rectangular bases, and the third the altitude,

These are the most simple expressions of geometrical magnitudes, and any other which has a known proportion to them, may in like manner be expressed algebraically Conversely, the geometrical magnitudes, represented by such algebraical quantities, may be found, only the algebraical dimensions above the third, not having any corresponding geometrical dimensions, must be expressed by proportionals

The opposite position of straight lines may be expressed by the signs + and −

Thus, let a point A be given in the line

p A M P B

AP, any segment AP taken to the right hand being considered as a positive, a segment Ap to the left is properly represented by a negative quantity If a and b represent two lines, and if, upon the line AB from the point A, AP be taken towards the right equal to a, it may be expressed by a, then PM taken to the left and equal to b, will be properly represented by $-b$, for AM is equal to $a-b$ If $a=b$, then M will fall upon A, and $a-b=0$ By the same notation, if b is greater than a, M will fall to the left of A, and in this case, if $2a=b$, and if Pp be taken equal to b, then $a-b=-a$ will represent Ap, which is equal to a, and situated to the left of A

In the solution of geometrical problems by means of algebra, the following remarks may be advantageously attended to Compare to-

gether the quantities concerned in the problem, and making no difference between the known and unknown quantities, consider how they depend upon, or are related to, one another, that we may perceive what quantities, if they are assumed, will, by proceeding synthetically, give the rest, and that in the simplest manner And in this comparison, the geometrical figure is to be feigned and constructed at random, as if all the parts were actually known or given, and any other lines drawn that may appear to conduce to the easier and simpler solution of the problem Having considered the method of computation, and drawn out the scheme, names are then to be given to the quantities entering into the computation, that is, to some few of them, both known and unknown, from which the rest may most naturally and simply be derived or expressed, by means of the geometrical properties of figures, till an equation be obtained by which the value of the unknown quantity may be derived by the ordinary methods of reduction of equations, when only one unknown quantity is in the notation, or till as many equations are obtained as there are unknown letters in the notation

For example, suppose it were required to inscribe a square in a given triangle Let ABC (fig 4 pl 13) be the given triangle, and draw DEFG to represent the required square, also draw the perpendicular BP of the triangle, which will be given, as well as all its sides Then, since the triangles BAC, BEF, are similar let the notation be thus make the base $AC = b$, the perpendicular $BP = p$, and the side of the square DE or $EF = x$ Hence then $BQ = BP - ED = p - x$, consequently, by the proportionality of the parts of those two similar triangles, viz BP AC BQ EF, it is p b $p - x$ x, then, multiply extremes and means, &c there arises $px = bp - bx$, or $bx + px = bp$, and $x = \frac{bp}{b+p}$ the side of the square sought, that is, a fourth proportional to the base and perpendicular, and the sum of the two, taking this sum for the first term, or AC + BP BP AC EF

When algebra is applied to the geometry of curves, the nature of the curve at any time under consideration is to be denoted by an algebraic equation, thus derived a line is conceived to be drawn, as the diameter or some other principal line about the curve, and upon any indefinite points of this line other lines are erected, either perpendicularly, or under any given angle, which are called ordinates, whilst the parts of the first line cut off by them are called abscisses Then, calling any absciss x, and its corresponding ordinate y, by means of the known nature, or relations of the other lines in the curve, an equation is derived, involving x and y, with other given quantities in it Hence, as x and y are common to every point in the primary line, that equation, so derived, will belong to every position or value of the absciss and ordinate, and so is properly considered as expressing the nature of the curve in all points of it, and is commonly called the equation of the curve

In this way it is found that any curve line has a peculiar form of equation belonging to it, which is different from that of every other curve, either as to the number of the terms, the powers of the unknown letters x and y or the signs or coefficients of the terms of the equation Thus, if the curve IIK (fig 3 pl 6) be a parabola, of which AP is part of the axis, and PQ a perpendicular ordinate then put the absciss $AP = x$, $PQ = y$, and the parameter $= p$, then the equation of the curve is $px = y^2$ See ABSCISS and EQUATION

Here also we may add a few remarks, relating to curves in general

1 If in any case a value of y vanishes, then the curve meets the base in a point determined by the corresponding value of x Hence, by putting $y = 0$, the roots of the equation, which in that situation are values of x, will give the distances on the base from the point assumed as the beginning of x, at which the curve meets it

2 If at a particular value of x, y becomes infinite, the curve has an infinite arc, and the ordinate at that point becomes an asymptote

3 If when x becomes infinite, y vanishes, the base is an asymptote

4 If any values of y become impossible, then on in any intersections of the ordinate and curve vanish If, at any value of x, all the values of y become impossible, the ordinate does not there meet the curve

5 If two values of y become equal and have the same sign, the ordinate in that situation either touches the curve, or passes through an intersection of two of its branches, which is called a punctum duplex, or through an oval become infinitely little, called a punctum conjugatum

In like manner is a punctum triplex, &c to be determined

The most valuable concise treatise, on the application of algebra to geometry, with which we are acquainted, is given by Lacroix, at the end of his Trigonometry

APPLICATIVE *a* (from *apply*) That does apply (*Bramhall*)

APPLICATORY *a* (from *apply*) That comprehends the act of application

APPLICATORY *s* That which applies (*Taylor*)

APPLY This term is used two different ways in geometry

1st, It signifies to transfer or place a given line, either in a circle or some other figure, so that the extremities of the line shall be in the perimeter of the figure

2d, It is also used to express division in geometry, or to find one dimension of a rectangle, when the area and the other dimension are given Thus, the area ab applied to the line c is $\frac{ab}{c}$

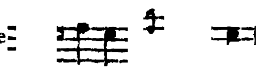
To APPLY 1 To suit, to agree

(*Shakspeare*) 2 To have recourse to, as a petitioner (*Swift*) 3 To attach by way of influence (*Rogers*)

To APPLY' *v a* (*applico*, Lat) 1 To put one thing to another (*Dryden*) 2 To lay medicaments upon a wound (*Addison*) 3 To make use of as relative or suitable to something (*Dryden*) 4 To put to a certain use (*Clarendon*) 5 To use as means to an end (*Rogers*) 6 To fix the mind upon, to study (*Watts*) 7 To address to (*Milton*) 8 To ply, to keep at work (*Sidney*)

APPOGIATURE or LEANING NOTE, in music, a note of embellishment in slow movements its chief office is to soften and smooth the effect of certain distances, and by dwelling upon a note of any chord, to retard the completion of the subsequent harmony In bold and energetic movements, a chain of appogiatures not only serve to link the greater intervals, but afford the singer or player full scope for the display of flexibility in voice or finger, and for the employment of intonation and impassioned expression The appogiature not being always in consonance with the bass and other parts, to avoid a visible breach of the laws of harmony, is generally written in a small note, as in this example

Appogiature



Whatever time is occupied by the appogiature, or any other grace, so much time is taken from the note it embellishes, so that the time of the whole bar is not augmented

To APPO'INT *v a* (*appointer*, Fr) 1 To fix any thing (*Galatians*) 2 To settle any thing by compact (*Judges*) 3 To establish any thing by decree (*Samuel*) 4 To furnish in all points to equip, to supply with all things necessary (*Hayward*)

APPOINTEE, in heraldry, is when two or more things are placed touching each other at the points or ends

APPO'INTER *s* (from *appoint*) He that settles or fixes any thing or place

APPO'INTMENT *s* (*appointement* Fr) 1 Stipulation (*Job*) 2 Decree, establishment (*Hooker*) 3 Direction, order (*Shakspeare*) 4 Equipment, furniture (*Shakspeare*) 5 An allowance paid to any man

To APPO'RTION *v n* (from *portio*, Lat) To set out in just proportions (*Collier*)

APPO'RTIONMENT *s* (from *apportion*) A dividing into portions

To APPO'SE *v a* (*appono*, Lat) 1 To put questions to (*Bacon*) 2 To apply to a Latinism (*Harvey*)

APPOSER signifies an examiner In the court of exchequer, there is an officer called the foreign apposer In the office of confirmation, in the first liturgy of Edward VI the rubric directs the bishop, or such as he shall appoint, to appose a child, and a bishop's examining chaplain was anciently called his poser

A'PPOSITE *a* (*appositus*, Lat) Proper; fit, well adapted (*Wotton Atterbury*)

A'PPOSITELY *ad* (from *apposite*) Properly, fitly, suitably (*South*)

A'PPOSITENESS *s* (from *apposite*) Fitness, propriety, suitableness (*Hale*)

APPOSI'TION *s* (*appositio*, Lat) 1 The addition of new matter (*Arbuthnot*) 2 In grammar, the putting of two nouns in the same case

To APPRAI'SE *v a* (*apprecier*, Fr) To set a value upon goods previous to sale

APPRAI'SER *s* (from *ad*, to, and *pretium*, *value*) One who rates or sets a value upon goods He is generally a broker, upholsterer, or auctioneer, and is employed in cases of death, bankruptcies, &c He takes an oath to do justice between party and party, and is, thence, called *sworn appraiser*

To APPREHE'ND *v a* (*apprehendo*, Lat) 1 To lay hold on (*Taylor*) 2 To seize, in order for trial or punishment (*Clarendon*) 3 To conceive by the mind (*Stillingfleet*) 4 To think on with terrour, to fear (*Temple*)

APPREHE'NDER *s* (from *apprehend*) Conceiver, thinker (*Glanville*)

APPREHE'NSIBLE *a* (from *apprehend*) That may be apprehended or conceived (*Brown*)

APPREHE'NSION *s* (*apprehensio*, Lat) 1 The mere contemplation of things (*Watts*) 2 Opinion, sentiments (*South*) 3 The faculty by which we conceive new ideas, or power of conceiving them (*Milton*) 4 Fear (*Addison*) 5 Suspicion of something (*Shakspeare*) 6 Seizure (*Shakspeare*)

APPREHE'NSIVE *a* (from *apprehend*) 1 Quick to understand (*South*) 2 Fearful (*Tillotson*) 3 Perceptive, feeling (*Milton*)

APPREHE'NSIVELY *ad* (from *apprehensive*) In an apprehensive manner

APPREHE'NSIVENESS *s* (from *apprehensive*) The quality of being apprehensive

APPRE'NTICE *s* (*apprenti*, Fr) One that is bound by covenant to serve another man of trade, upon condition that the tradesman shall instruct him in his art (*Dryden*)

Apprentices may be bound to husbandmen, or even to gentlemen and they, as well as tradesmen, in England, are compellable to take the children of the poor, whom the overseers, with the consent of two justices, may bind till the age of twenty one years Apprentices may be discharged on reasonable cause, but if any, whose premium has been less than ten pounds, run away from their masters, they are compellable to serve out the time of absence, or give satisfaction for it, at any period within seven years after expiration of the original contract Apprentices gain a settlement in that parish, where they last served forty days, and by the 5th of Elizabeth, c 4 they have an exclusive right to exercise the trade in which they have been instructed in any part of England

Apprentices' indentures, and articles of clerkship, pay a stamp duty of seven shillings Pa-

rish indentures are excepted, and pay sixpence only, by 5 W III c 21 In the case of attorneys clerks, there is a farther duty of 100l if the articles be in order to admission in the courts at Westminster, and 50l if such articles are in order to admission in any inferior court, holding pleas to the amount of 40s For fees given with apprentices, clerks, or servants, bound or articled by indentures, from 1l to 50l masters pay for every pound sixpence, and for fees above 50l one shilling in the pound 8 Ann c 9

It is enacted by the 5th Eliz c 4 s 31 "That it shall not be lawful to any person or persons, other than such as now do lawfully use or exercise any art, mystery, or manual occupation to set up, occupy, use, or exercise any craft, mystery, or occupation, now used or occupied within the realm of England or Wales, except he shall have been brought up therein seven years at the least, as an apprentice, nor to set any person on work in such mystery, art, or occupation, being not a workman at this day, except he shall have been apprentice, as is aforesaid, or else having served as an apprentice, as is aforesaid, shall or will become a journeyman, or hired by the year, upon pain that every person willingly offending, or doing the contrary, shall forfeit and lose, for every default forty shillings for every month It is agreed that this statute extends only to such trades as require skill and experience, thus, brewers, bakers, and cooks, when followed as trades, are within the statute, but merchant husbandmen, gardeners, hemp-dressers, &c are not See Tomlins's ed of Jacob's Dictionary

To APPRE'NTICE *v a* (from the noun) To put out to a master as an apprentice (*Pope*)

APPRE'NTICEHOOD *s* (from *apprentice*) The years of an apprentice's servitude (*Shakspeare*)

APPRE'NTICESHIP *s* (from *apprentice*) The years which an apprentice is to pass under a master (*D[illegible]*)

APPRESSED, APPRESSUS, or ADPRESSUS pressed or squeezed close Contiguous or laid to, *With* Applied to a leaf, when the disk approaches so near to the stem, as to seem as if it had been pressed to it by violence also to a calyx, when it is close to the peduncle, and to a peduncle, when it is close to the branch or stem

APPRISING, in Scots law, the name of an action by which a creditor formerly became invested with the estate of his debtor for payment

To APPRI'ZE *v a* (*appris*, Fr) To inform, to give the knowledge of (*Cheyne*)

To APPRO'ACH *v n* (*approcher*, Fr) 1 To draw near, locally (*Shakspeare*) 2 To draw near, as time (*Gay*) 3 To make a progress toward (*Locke*) 4 To come near, by natural affinity, or resemblance

To APPRO'ACH *v a* 1 To bring near to (*Dryden*) 2 To come near to (*Temple*)

APPRO'ACH *s* (from the verb) 1 The act of drawing near (*Denham*) 2 Access (*Bacon*) 3 Hostile advance (*Shakspeare*) 4 Means of advancing (*Dryden*)

Curve of equable Approach, is the name given to a curve proposed by Leibnitz, down which a body descending by the force of gravity shall make equal approaches to the horizon in equal portions of time It is also called the isochronous or isochronal curve Huygens, in 1687, made public the construction and properties of this curve it is the second cubical parabola, placed with its vertex uppermost, and which the descending body must enter with a certain determinate velocity In 1689, Leibnitz proposed the paracentric isochronal curve, in which a body would equally approach or recede from a given point in equal times, under any law of gravity this was solved by the Bernoullis and by Varignon And Maupertuis resolved the problem in the case of a body descending in a medium, which resists as the square of the velocity Hist de Acad Sci for 1699 and 1730

APPRO'ACHER *s* (from *approach*) the person that approaches (*Shakspeare*)

APPROACHES, or LINES OF APPROACH, are particularly used for trenches dug in the ground, and their earth thrown up on the side next the place besieged, under shelter or defence whereof the besiegers may approach, without loss, to the parapet of the covered way, and plant guns, &c wherewith to cannonade the place The lines of approach are to be connected by parallels or lines of communication

Method of Approaches, in algebra, a process by trials, the results of which approach nearer and nearer to the truth This is nearly similar to what is now called APPROXIMATION

APPRO'ACHMENT *s* The act of coming near (*Brown*)

APPROBA'TION *s* (*approbatio*, Latin) 1 The act of approving, or expressing himself pleased or satisfied (*Shakspeare*) 2 The liking of any thing (*South*) 3 Attestation, support (*Shakspeare*)

APPRO'OF *s* (from *approve*) Approbation, commendation (*Shakspeare*)

To APPROPI'NQUE *v n* (*appropinquo*, Lat) To draw near to not in use (*Hudib*)

APPRO'PRIABLE *a* (from *appropriate*) That it may be appropriated (*Brown*)

To APPRO'PRIATE *v a* (*approprier*, Fr) 1 To consign to some particular use or person (*Roscommon*) 2 To claim or exercise, to take to himself by an exclusive right (*Milton*) 3 To make peculiar, to annex (*Locke*) 4 (In law) To alienate a benefice (*Ayliffe*)

APPRO'PRIATE *a* (from the verb) Peculiar, consigned to some particular use or person, belonging peculiarly (*Stillingfleet*)

APPROPRIA'TION *s* (from *appropriate*) 1 The application of something to a particular purpose (*Locke*) 2 The claim of any thing as peculiar (*Shakspeare*) 3 The fixing a particular signification to a word (*Locke*)

APPROPRIATION, in canon law, the annexing of an ecclesiastical benefice to the proper and perpetual use of some religious house, bishopric, college, or spiritual person, to enjoy for ever, in the same way as impropriation is the annexing a benefice to the use of a lay person or corporation, that which is an appropriation in the hands of religious persons, being usually called an impropriation in the hands of the laity It is computed that there are in England 3845 impropriations

This contrivance seems to have sprung from the policy of monastic orders At the first establishment of the parochial clergy, the tithes of the parish were distributed into four parts, one for the bishop, one to maintain the fabric of the church, a third for the poor, and a fourth for the incumbent The sees of the bishops becoming amply endowed, their shares sunk into the others, and the monasteries inferring that a small part was enough for the officiating priests, appropriated as many benefices as they could by any means obtain, to their own use, undertaking to keep the church in repair, and to keep it constantly served But, in order to complete such appropriation effectually, the king's licence and consent of the bishop must first be obtained, because they might both, some time or other, have an interest, by lapse, in the benefice, if it were not in the hands of a corporation which never dies The consent of the patron also is necessarily implied, because the appropriation can be originally made to none but to such spiritual corporation as is also the patron of the church, the whole being indeed nothing else but an allowance for the patrons to retain the tithes and glebe in their own hands, without presenting any clerk, they themselves undertaking to provide for the service of the church When the appropriation is thus made, the appropriators and their successors are perpetual parsons of the church, and must sue and be sued, in all matters concerning the rights of the church, by the name of parsons

This appropriation may be severed, and the church become disappropriate, two ways, as, first, if the patron or appropriator present a clerk who is instituted and inducted to the parsonage, for such incumbent is to all intents and purposes a complete parson, and the appropriation being once severed can never be reunited, unless by a repetition of the same solemnities And when the clerk so presented is distinct from the vicar, the rectory thus vested in him becomes what is called a sine-cure, because he hath no cure of souls, having a vicar under him to whom that cure is committed Also, if the corporation which has the appropriation is dissolved, the parsonage becomes disappropriate at common law because the perpetuity of person is gone, which is necessary to support the appropriation

In this manner and subject to these conditions, may appropriations be made at this day, and thus were most if not all of the appropriations at present existing originally made; being annexed to bishoprics, prebends, religious houses, nay, even to nunneries, and certain military orders, all of which were spiritual corporations At the dissolution of monasteries by statutes 27 Hen. VIII c 28 and 31 Hen VIII c 13 the appropriations of several parsonages, which belonged to those respective religious houses (amounting to more than one-third of all the parishes in England), would have been by the rules of the common law disappropriated See the articles PARSON and VICAR

APPROPRIA'TOR *s* (from *appropriate*) He that is possessed of an appropriated benefice (*Ayliffe*)

APPRO'VABLE *a* (from *approve*) That merits approbation (*Brown*)

APPRO'VAL *s* (from *approve*) Approbation (*Temple*)

APPRO'VANCE *s* (from *approve*) Approbation (*Thomson*)

To APPRO'VE *v a* (*approuver*, French) 1 To like, to be pleased with (*Hooker*) 2 To express liking (*Locke*) 3 To prove, to show (*Tillotson*) 4 To experience not in use (*Shakspeare*) 5 To make, or show, to be worthy of approbation (*Rogers*)

APPRO'VEMENT *s* (from *approve*) Approbation, liking (*Hayward*)

APPRO'VER *s* (from *approve*) 1 He that approves 2 He that makes trial (*Shakspeare*) 3 (In law) One that, confessing felony of himself, accuses another (*Cowell*)

APPROVER, in ancient law, a bailiff or land steward

APPROVERS of the king, are those who have the letting of the king's demesnes in small manors

APPRO'XIMATE *ad* (from *ad* and *proxima*) Near to (*Brown*)

APPRO'XIMATING LEAVES Growing very near each other Opposed to remote With reference to the stem, growing almost upright

APPRO'XIMATION, in arithmetic, and algebra, the method of approaching still nearer to the quantity sought, without a possibility of finding it exactly Methods of continual approximation for the square, cube, and other roots of surd numbers, have been invented by various mathematicians from Lucas de Burgo down to the present time for some of these we refer to the articles EXTRACTION and ROOT

APPROXIMATION *to the Roots of Equations* There have been various rules given for this purpose by different authors we insert a rule of sir Isaac Newton's as one of the most simple

Lemma If any two numbers, being inserted for the unknown quantity in an equation, give results with opposite signs, an odd number of roots must be between these numbers

This appears from the property of the absolute term, and from this obvious maxim, that if a number of quantities be multiplied together, and if the signs of an odd number of them be

changed, the sign of the product is changed For, when a positive quantity is inserted for x, the result is the absolute term of an equation whose roots are less than the roots of the given equation by that quantity If the result has the same sign as the given absolute term, then from the property of the absolute term either none, or an even number only, of the positive roots have had their signs changed by the transformation, but if the result has an opposite sign to that of the given absolute term, the signs of an odd number of the positive roots must have been changed In the first case, then, the quantity substituted must have been either greater than each of an even number of the positive roots of the given equation, or less than any of them, in the second case it must have been greater than each of an odd number of the positive roots An odd number of the positive roots, therefore, must lie between them when they give results with opposite signs The same observation is to be extended to the substitution of negative quantities and the negative roots

From this lemma, by means of trials, it will not be difficult to find the nearest integer to a root of a given numeral equation

Let the equation be $x^3 - 2x - 5 = 0$

1 In this case a root is between 2 and 3, for these numbers being inserted for x, the one gives a positive, and the other a negative, result Either the number above the root, or that below it, may be assumed as the first value, only it will be more convenient to take that which appears to be nearest to the root

2 Suppose $x = 2 + f$, and substitute this value of x in the equation

$$\begin{aligned} x^3 &= 8 + 12f + 6ff + f^3 \\ -2x &= -4 - 2f \\ -5 &= -5 \end{aligned}$$

$$x^3 - 2x - 5 = -1 + 10f + 6f^2 + f^3 = 0$$

If f is less than unit, its powers f^2 and f^3 may be neglected in this first approximation and $10f = 1$, or 0 1 nearly, therefore $x = 2\ 1$ nearly

3 As $f = 0\ 1$ nearly, let $f = 1 + g$, and insert this value of f in the preceding equation

$$\begin{aligned} f^3 &= 0\ 001 + 0\ 03g + 0\ 3g^2 + g^3 \\ 6f^2 &= 0\ 06 + 1\ 2g + 6\ g^2 \\ 10f &= 1 + 10g \\ -1 &= -1 \end{aligned}$$

$f^3 + 6f^2 + 10f - 1 = 0\ 061 + 11\ 23g + 6\ 3g^2 + g^3 = 0$, and neglecting g^2 and g^3 as very small, $0\ 61 + 11\ 23g = 0$, or $g = \frac{-0\ 061}{11\ 23} = -\ 0054$, hence $f = 0\ 1 + g = 0946$ nearly, and $x = 2\ 0946$ nearly

4 This operation may be continued to any length, as by supposing $g = -\ 00\,4 + h$, and so on, and the value of $x = 2\ 09455147$ nearly

By the first operation a nearer value of x may be found thus since $f = 1$ nearly, and $-1 + 10f + 6f^2 + f^3 = 0$ $f = \frac{1}{10 + 6f + f^2}$, that is, $f = \frac{1}{10 + 6 + 01} = 094$ true to the last figure, and $x = 2\ 094$

In the same manner may the root of a pure equation be found, and this gives an easy method of approximating to the roots of numbers which are not perfect powers

This rule is applicable to numeral equations of every order, and, by assuming a general equation, general rules may be deduced for approximating to the roots of any proposed equation By a similar method we may approximate to the roots of literal equations, which will be expressed by infinite series

Other ingenious methods of approximation to the roots of equations, may be seen in Clairaut s Algebra, in Newton's, Simpson's, Bonnycastle s and Frend s, and in Hutton's Course of Mathematics On this subject, too, the reader may consult J, Bernoulli, Operum, tome iii Taylor, in Phil Trans an 1717, Simpson s Essays, his select Exercises, and Lagrange in Mem Acad Berlin, an 1767 See also EQUATIONS and EXPEDIENT

APPUI, (French,) or stay upon the hand, is the reciprocal sense between the horse s mouth and the bridle hand, or in other words, the sense of the action of the bridle in the horseman s hand The true and right appui of the hand, is the nice bearing or stay of the bridle, so that the horse is intimidated by the sensibility and tenderness of the parts of his mouth, from resting much upon the bit-mouth, or checking, or beating upon the hand to withstand it Thus it is said such a horse has a dull appui, that is, has a good mouth, but his tongue is so thick and large, that the bit cannot work upon the bars, for the tongue not being so sensible or tender as the bars, it is soon hardened by the bit, and renders the appui not good Sometimes the bit does not press the bars in the quick, from the grossness of the tongue or lips, or because your horse has a rest, or stay, that forces the hand, which shews that he has a bad mouth A horse is said to have no appui or rest upon the hand, when through fear of the hand he will not suffer the bit to press or bear in any degree on the parts of his mouth, whence he does not easily obey the bridle If you mean to give a horse that is taught a good appui, or a good rest upon the hand, you must often gallop him, and put him back, a long stretch gallop is likewise very proper for the same purpose, for in galloping he gives the rider an opportunity of bearing upon the hand

A horse that throws himself too much on the bit, is, in the language of the manage, said to have too much appui A full appui upon the hand, is a firm stay, without resting heavy, and without bearing on the hand this last is a necessary qualification for horses intended for the army A more than full appui, is when a horse requires some force to stop him, but yet he does not force the hand this appui is good for such horsemen as depend upon the bridle instead of their thighs

APPU'LSE *s* (*appulsus*, Lat) The act of striking against any thing (*Holder*)

APPULSE, in astronomy, the actual contact of two luminaries, according to some authors, but others describe it as their near approach to

each other, so as to be seen, for instance, within the same telescope The appulses of the planets to the fixed stars have always been very useful to astronomers, as serving to fix and determine the places of the former The ancients, wanting an easy method of comparing the planets with the ecliptic, which is not visible, had scarce any other way of fixing their situations, but by observing their track among the fixed stars, and marking their appulses to some of those visible points See Hist Acad Scienc for 1710, pa 417 and Philos Trans No 369, where Dr Halley has given a method of determining the places of the planets, by observing their near appulses to the fixed stars

APPURTENANCES, in common law, signifies things corporeal and incorporeal that appertain to another thing as principal, as hamlets to a manor, and common of pasture and fishery Things must agree in nature and quality to be appurtenant, as a turbary, or a seat in a church, to a house

APRICOTS, in botany See PRUNUS

APRIL, the fourth month of the year, according to the common computation, but the second, according to that of the astronomers It contains 30 days —The word is derived from *aprilis*, of *aperio* I open, because the earth, in this month, begins to open her bosom for the production of vegetables

A PRIORI, a kind of demonstration See DEMONSTRATION

A'PRON s 1 A cloth hung before, to keep the other dress clean (*Addison*) 2 A piece of lead which covers the touch hole of a great gun

A'PRON-MAN s (from *apron* and *man*) A workman, an artificer (*Shakspeare*)

A'PRONED a (from *apron*) Wearing an apron (*Pope*)

APSES, in astronomy, are the two points in the orbits of planets, where they are at their greatest and least distance from the sun or the earth, the point at the greatest distance being called the higher apsis, and that at the nearest distance the lower apsis And the two apses are also called auges Also the higher apsis is more particularly called the aphelion, or the apogee, and the lower apsis, the perihelion, or the perigee The diameter which joins these two points is called the line of the apses or of the apsides, and it passes through the centre of the orbit of the planet, and the centre of the sun or the earth, and in the modern astronomy this line makes the longer or transverse axis of the elliptical orbit of the planet In this line is counted the excentricity of the orbit, being the distance between the centre of the orbit and the focus, where is placed the sun or the earth

The foregoing definitions suppose the lines of the greatest and least distances to lie in the same straight line, which is not always precisely the case; as they are sometimes out of a right line, making an angle greater or less than 180 degrees, and the difference from 180 degrees is called the motion of the line of the when the angle is less than 180 degrees, the motion of the apses is said to be contrary to the order of the signs, on the other hand, when the angle exceeds 180 degrees, the motion is according to the order of the signs See APHELION

APSIS, or ABSIS, signifies the bowed or arched roof of a house, room, or oven, &c as also the ring or compass of a wheel

APSIS, in ecclesiastical writers, denotes an inner part in the ancient churches, wherein the clergy sat, and where the altar was placed

The same word is used for the bishop's throne, in ancient churches likewise for a case in which the relics of saints are kept

APT, a town of France, and principal place of a district, in the department of the Mouths of the Rhone, before the revolution, the see of a bishop, suffragan of Aix the cathedral is said to be one of the oldest in France, and a council was held here in 1365 It is situated on the river Calavon nine leagues L Avignon, and seven N Aix Long 23 4 E Ferro Lat 43 52 N

APT a (*aptus*, Latin) 1 Fit (*Hooker*) 2 Having a tendency to (*Hooker*) 3 Inclined to; led to (*Bentley*) 4 Ready, quick (*Shakspeare*) 5 Qualified for (*Sidney*)

To APT v a (*aptus*, Latin) 1 To suit to adapt (*Ben Jonson*) 2 To fit, to qualify (*Denham*)

To A'PTATE v a (*aptatum*, Latin) To make fit (*Bailey*)

APTENODYTES Penguin A genus of the class and order aves anseres Bill straight a little compressed and sharp edged, the upper mandible longitudinally obliquely grooved, the lower truncate at the tip, tongue with reflected prickles, wings fin-shaped, without quill feathers, feet fettered, four-toed Eleven species This genus much resembles the awk in colour, food, stupidity, eggs, nest, position of the legs behind the equilibrium, and consequent erect posture, they are totally unfit for flight but swim dexterously, nostrils linear hid in the groove of the bill, palate, as well as the tongue, beset with a few rows of conic retroflected stiff papillæ, wings covered with strong, broad membrane, tail short, wedged the feathers very rigid They are chiefly inhabitants of Falkland islands, and the shores of the Southern ocean

A'PTERA Wingless insects An order of the Linnéan class insectæ characterised, as the term aptera expresses, by having no wings in either sex See ZOOLOGY

APTHANE, a title formerly given to the chief Scotch nobility

A'PTITUDE s (French) 1 Fitness (*Decay of Piety*) 2 Tendency (*Decay of Piety*) 3 Disposition (*Locke*)

A'PTLY ad (from *apt*) 1 Properly, fitly (*Blackmore*) 2 Justly, pertinently (*Addison*) 3 Readily, acutely: as, he learned his business very aptly

A'PTNESS s (from *apt*) 1 Fitness, suitableness (*Norris*) 2 Disposition to any thing (*Shakspeare*) 3 Quickness of apprehension (*Bacon*) 4 Tendency (*Addison*)

APTOTE, (of α and πτῶσις) A noun which is not declined with cases

APULEIUS, a learned man who studied at Carthage, Athens, and Rome, where he married a rich widow, for which he was accused of using magical arts to win her heart His apology was a masterly composition He learnt Latin without a master The most famous of his works extant is the Golden Ass, in eleven books, an allegorical piece replete with morality Apuleius was born at Madaura, a Roman colony in Africa, and lived in the second century under the Antonines

APUS, AVIS INDICA, in astronomy, a constellation of the southern hemisphere placed near the pole, between the triangulum australe and the chameleon, supposed to represent the bird of paradise It contains 11 stars of the first six magnitudes, namely 0 0 0 4 3 4

APYCNI, in music, the collective name given by the ancient Greeks to those three sounds in their scale or system, which separately were called proslambanomenos, nete synnemenon, and nete hyperbolæon

APYREXIA (*apyrexia*, ἀπυρεξία, from α priv and πυρεξία, *a fever*) Apyrexy Without fever The intermission of feverish heat

APYROI, in antiquity, altars whereon sacrifices were offered without fire

APYROUS, a term formerly used to denote that property in some bodies by which they resist the most violent fire, without suffering any sensible change, but as it is probable that there are no bodies which are strictly and essentially apyrous, it is now become merely a relative term

AQUA The origin of this word has strangely puzzled our lexicographers A quâ vivimus, is the ridiculous derivation of Festus Æqua, from its smooth surface, that of Varro Scaliger travels farther, but with no better success, and derives it from an old Greek word αχα, equivalent to the Latin æqua, and equally explanatory The radical may be found in most oriental languages חך (aq), in Chaldaic implies *a flux* or *tide*, whence probably the Greek ηχω and ιχω, *to come* חגה (aga or agua), in Heb *to be boisterous, to murmur* or *roar, to carry off with vehemence*, ideas all appertaining to the waves of the sea See WATER

AQUA ALUMINIS COMPOSITA Aqua aluminosa bateana This preparation is employed externally as a detergent It forms a useful collyrium if properly diluted, and is an excellent injection for the cure of leucorrhœa

AQUA AMMONIÆ Spiritus salis ammoniaci This preparation is called carbonas ammoniacæ liquidus in the new chemical nomenclature Similar to this in composition and virtues is the liquor volatilis cornu cervi They are highly esteemed for their stimulating, nervine, antacid virtues, and are administered in debility, typhus, ataxia, atonic spasms, paralysis, syncope, podagra, rheumatism, &c They are also employed externally with fixed oils, in paralysis, indolent tumours, and internal inflammations

AQUA AMMO'NIÆ ACETATÆ Acetis ammoniacalis Spiritus Mindereri This preparation is called acetis ammoniacæ liquidus in the new chemical nomenclature, it being a neutral salt in solution, formed by the combination of acetous acid with ammoniac It is much esteemed as possessing nervine, diaphoretic, diuretic, and deobstruent virtues

AQUA AMMO'NIÆ PURÆ Spiritus salis ammoniaci cum calce Water saturated with ammoniacal gas It is much used to smell at in faintings, &c and possesses the same properties as ammoniacal gas See AMMONIAC

AQUA ANE'THI Aqua seminum anethi For the virtues of this distilled water, see ANETHUM

AQUA CA'LCIS Lime water It is given internally in cardialgia, spasms, diarrhœa, and convulsions of children, arising from acidity or ulcerated intestines, intermittent fevers, &c. Externally it is applied to burns and ulcers

AQUA CINNAMO'MI Aqua cinnamomi simplex Distilled cinnamon water For its virtues, see CINNAMOMUM

AQUA CŒLESTIS, or AQUA SAPPHIRINA, a beautiful blue solution, formed by precipitating copper from its sulphate, or copperas, by the addition of liquid ammonia, and which precipitation is dissolved almost as soon as formed

AQUA CUPRI AMMONIA'TI Aqua sapphirina This preparation is employed by surgeons to stimulate and clear foul ulcers

AQUA CUPRI VITRIOLA'TI COMPOSITA This preparation of the Edinburgh Pharmacopœia is used externally to stop hæmorrhages of the nose

AQUA DISTILLA'TA See WATER

AQUA FŒNI'CULI For the virtues of distilled fennel water, see FŒNICULUM

AQUA FORTIS See ACIDUM NITROSUM DILUTUM

* AQUA KALI Oleum tartari per deliquium Lixivium tartari This is the liquid carbonate of potash, carbonas potassæ liquidus It possesses antacid virtues, and is a good antidote against arsenic taken into the stomach It is also given with advantage in convulsions and spasms, from acidity in the stomach of children, in calculous diseases, gouty affections, scrophula, aphthæ, &c The carbonate of soda is milder, and perhaps a preferable remedy for general use See CARBONAS SODÆ

AQUA KALI PURI Lixivium saponarium This possesses diuretic and lithontriptic virtues, enveloped in weak broths or mucilaginous drinks Diluted in tepid water, in the proportion of three drops to two ounces, it serves as an efficacious detergent in xerophthalmia

AQUA LITHA'RGYRI ACETATI Acetum lithargyri Extractum saturni This is the celebrated extract of Goulard It is called acetis plumbi liquidus in the new chemical nomenclature It is principally employed by surgeons in the aqua lithargyri acetati composita, &c externally, as a resolvent against inflammatory affections

AQUA LITHA'RGYRI ACETATI COMPOSITA Aqua vegeto mineralis, Goulard's ve-

geto-mineral water The virtues of this water are resolvent, refrigerant, and sedative

AQUA MARINA See GEMMA

AQUA MENTHÆ PIPERI'TIDIS See MENTHA PIPERITIS

AQUA MENTHÆ SATIVÆ Aqua menthæ vulgaris simplex See MENTHA SATIVA

AQUA PIMENTO Aqua piperitidis Jamaicensis For the virtues of this distilled water, see PIMENTO

AQUA PULE'GII Aqua pulegii simplex For its virtues, see PULEGIUM

AQUA REGIA, or AQUA REGALIS, a mixture of nitrous and muriatic acids in different proportions, so called formerly on account of its being then the only acid known capable of dissolving gold Its modern name is nitro-muriatic acid

AQUA ROSÆ Aqua rosarum damascenarum Distilled rose water is employed only as a pleasant vehicle for other medicines, collyria, &c

AQUA SULPHURATA, the gas sulphuris of Van Helmont, is the liquid sulphureous acid

AQUA VITÆ, or WATER OF LIFE, is a name familiarly applied to native distilled spirits, somewhat corresponding to brandy when obtained from grape wine, and malt spirits when procured from that substance Of the first kind are the eau de vie of the French, and of the second the usquebaugh of the Irish, and the whisky of the Scotch

AQUA ZINCI VITRIOLA'TI CUM CAMPHORA Aqua vitriolica camphorata This, when properly diluted, is an useful collyrium for inflammation of the eyes, in which there is a weakness of the parts Externally it is applied by surgeons to scorbutic and phagedenic ulcerations

AQUÆ MINERA'LES See WATERS, MINERAL

AQUÆDUCT, AQUÆDUCTUS, q d ductus aquæ, a conduit of water, is a construction of stone or timber, built on an uneven ground, to preserve the level of water, and convey it, by a canal, from one place to another There are aquæducts under ground, and others raised above it, supported by arches The Roman were very magnificent in their aquæducts, they had some that extended an hundred miles Frontinus, a man of consular dignity, and who had the direction of the aquæducts under the emperor Nerva, tells us of nine that emptied themselves through 13,594 pipes of an inch diameter Vigenere has observed, that, in the space of twenty-four hours, Rome received from these aquæducts no less than five hundred thousand hogsheads of water The three chief aquæducts now in being are those of the Aqua Virginea, Aqua Felice, and Aqua Paulina

AQUÆDUCT OF FALLOPIUS A canal in the petrous portion of the temporal bone, first accurately described by Fallopius

AQUÆMANILIS (from *aqua*, water, and *manus*, hand) In ecclesiastical writers, a kind of bason or laver, anciently placed in the vestibules of churches, to wash the hands in

AQUAMBOU See ACAMBOU

AQUARIANS, Christians in the primitive church who consecrated water in the eucharist instead of wine, under pretence of abstinence and temperance

AQUARIUS, in astronomy, one of the celestial constellations, being the eleventh sign in the zodiac, reckoning from Aries, and is marked by the character ♒, representing part of a stream of water, issuing from the vessel of Aquarius, or the water-pourer This sign also gives name to the eleventh part of the ecliptic, through which the sun moves in part of the months of January and February The stars in this constellation are commonly estimated at 58 of the first six magnitudes, i e 0 0 2 5 9 42

AQUARTIA In botany, a genus of the class and order tetrandria monogynia Calyx campanulate, corol wheel-shaped, with linear segments, berry many-seeded Two species natives of South America

AQUATIA, in middle age writers, a right of fishing three days in a year

AQUATICA NUX See TRIBULUS AQUATICUS

AQUA'TICK *a* (*aquaticus* Latin) 1 That inhabits the water (*Ray*) 2 That grows in the water (*Mortimer*)

AQUATICUM, in middle age writers, a right to use water

A'QUATILE *a* (*aquatilis*, Latin) That inhabits the water (*Brown*)

AQUATINTA, a method of etching on copper, lately invented, and by which a soft and beautiful effect is produced, resembling a fine drawing in water colours or Indian ink Aquatinta engraving is a particular method of corroding a copper plate with aqua fortis The best description of the process we have seen, is the following, given in Dr Rees's New Cyclopædia

The work is effected by covering the copper with a powder or some substance which takes a granulated form, so as to prevent the aqua-fortis from acting where the particles adhere, and by this means cause it to corrode the copper partially, and in the interstices only When these particles are extremely minute, and near to each other, the impression from the plate appears to the naked eye exactly like a wash of Indian ink But when they are larger, the granulation is more distinct, and as this may be varied at pleasure, it is capable of being adapted with great success to a variety of purposes and subjects

This powder or granulation is called the aquatinta grain, and there are two general modes of producing it

We shall first describe what is called the powder grain, because it was the first that was used Having etched the outline on a copper-plate prepared in the usual way by the copper-smith (for which see the article ETCHING), some substance must be finely powdered and sifted which will melt with heat, and when cold adhere to the plate, and resist the action of aqua fortis The substances which have been used for this purpose, either separately or

mixed, are asphaltum, Burgundy pitch, resin, gum-copal, and gum-mastic, and, in a greater or less degree, all the resins and gum-resins will answer the purpose Common resin has been most generally used, and answers tolerably well, though gum-copal makes a grain that resists the aqua fortis better The substance intended to be used for the grain must now be distributed over the plate as equally as possible, and different methods of performing this essential part of the operation have been used by different engravers, and at different times The most usual way is to tie up some of the powder in a piece of muslin, and to strike it against a piece of stick held at a considerable height above the plate By this, the powder that issues falls gently, and settles equally over the plate Every one must have observed how uniformly hair-powder settles upon the furniture after the operations of the hair-dresser this may afford a hint towards the best mode of performing this part of the process The powder must fall upon it from a considerable height, and there must be a sufficiently large cloud of dust formed The plate being covered equally over with the dust or powder, the operator is next to proceed to fix it upon the plate, by heating it gently, so as to melt the particles This may be effected by holding under the plate lighted pieces of brown paper rolled up, and moving them about till every part of the powder is melted This will be known by its change of colour, which will turn brownish It must now be suffered to cool, when it may be examined with a magnifier, and if the grains or particles appear to be uniformly distributed, it is ready for the next part of the process

The design or drawing to be engraved must now be examined, and such parts of it as are perfectly white are to be remarked Those corresponding parts of the plate must be covered, or stopped out, as it is called, with turpentine, or what is better, mastic varnish, diluted with turpentine to a proper consistence to work freely with the pencil, and mixed with lamp-black to give it colour, for, if transparent, the touches of the pencil would not be so distinctly seen The margin of the plate must also be covered with varnish When the stopping out is sufficiently dry, a border of wax must be raised round the plate in the same manner as in etching, and the aqua-fortis, properly diluted with water, poured on This is called biting in, and it is that part of the process which is most uncertain, and which requires the greatest degree of experience When the aqua-fortis has lain on so long that the plate, when printed, would produce the lightest tint in the drawing, it is poured off, and the plate washed with water, and dried When it is quite dry, the lightest tints are stopped out, and the aqua-fortis poured on as before, and this is repeated as often as there are tints to be produced in the plate

Although many plates are etched entirely by this method of stopping out and biting in alternately, yet it may be easily conceived that in general it would be very difficult to stop round and leave out all the finishing touches, as also the leaves of trees, and many other objects, which it would be impossible to execute with the necessary degree of freedom in this manner

To overcome this difficulty, another very ingenious process has been invented, by which the touches are laid on the plate with the same ease and expedition as they are in a drawing in Indian ink Fine washed whiting is mixed with a little treacle or sugar, and diluted with water in the pencil, so as to work freely, and this is laid on the plate covered with the aquatint ground, in the same manner and on the same parts as ink on the drawing When this is dry, the whole plate is varnished over with a weak and thin varnish of turpentine, asphaltum, or mastic, and then suffered to dry, when the aqua fortis is poured on The varnish will immediately break up in the parts where the treacle mixture was laid, and expose all those places to the action of the acid, while the rest of the plate remains secure The effect of this will be, that all the touches, or places where the treacle was used, will be bit in deeper than the rest, and will have all the precision of touches in Indian ink

After the plate is completely bit in, the bordering wax is taken off by heating the plate a little with a lighted piece of paper, and it is then cleared from the ground and varnish by oil of turpentine, and wiped clean with a rag and a little fine whiting, and then it is ready for the printer

The principal disadvantages of this method of aquatinting are, that it is extremely difficult to produce the required degree of coarseness or fineness in the grain, and that plates so engraved do not print many impressions without wearing out It is therefore now very seldom used, though it is occasionally of service

We next proceed to describe the second method of producing the aquatint ground, which is generally adopted Some resinous substance is dissolved in spirits of wine, as for instance common resin, Burgundy pitch, or mastic, and this solution is poured all over the plate, which is then held in a slanting direction till all the superfluous fluid drains off, and it is then laid down to dry, which it does in a few minutes If the plate be then examined with the magnifier, it will be found that the spirit in evaporating has left the resin in a granulated state, or rather, that the latter has cracked in every possible direction, still adhering firmly to the copper A grain is thus produced with the greatest ease, which is extremely regular and beautiful, and much superior for most purposes to that produced by the other method After the grain is formed, every part of the process is conducted in the same manner as above described

Having thus given a general idea of the art, we shall mention some particulars necessary to be attended to, in order to ensure success in the operation The spirits of wine must be

rectified, and of the best quality what is sold in the shops contains camphor, which would entirely spoil the grain

Resin, Burgundy pitch, and gum-mastic, when dissolved in spirits of wine, produce grains of a different appearance and figure, and are sometimes used separately and sometimes mixed in different proportions, according to the taste of the artist, some using one substance and some another

In order to produce a coarse or fine grain, it is necessary to use a greater or smaller quantity of resin, and to ascertain the proper proportions, several spare pieces of copper must be provided, on which the liquid may be poured, and the grain examined before it is applied to the plate to be engraved

After the solution is made, it must stand still and undisturbed for a day or two, till all the impurities of the resin have settled to the bottom, and the fluid is perfectly pellucid No other method of freeing it from those impurities has been found to answer Straining it through linen or muslin fills it with hairs, which are ruinous to the grain

The room in which the liquid is poured on the plate must be perfectly still, and free from dust, which, whenever it falls on the plate while wet, causes the grain to form a white spot, which it is impossible to remove without laying the grain afresh

The plate must be previously cleaned, with the greatest possible care, with a rag and whiting, as the smallest stain or particle of grease produces a streak or blemish in the grain

All these attentions are absolutely necessary to produce a tolerable regular grain, and, after every thing that can be done by the most experienced artists, still there is much uncertainty in the process They are sometimes obliged to lay on the grain several times before they procure one sufficiently regular The same proportions of materials do not always produce the same effect, as it depends in some degree upon their qualities, and is even materially affected by the weather These difficulties are not to be surmounted but by a great deal of experience, and those who are daily in the habit of practising the art are frequently liable to the most unaccountable accidents Indeed it is much to be lamented, that so elegant and useful a process should be so delicate and uncertain

It being necessary to hold the plate in a slanting direction in order to drain off the superfluous fluid, there will naturally be a greater body of the liquid at the bottom than at the top of the plate On this account, a grain laid in this way is always coarser at that side of the plate that was held lowermost The most usual way is, to keep the coarsest side for the foreground, being generally the part that has the deepest shadows. In large landscapes, sometimes various parts are laid with different grains, according to the nature of the subject

The finer the grain is, the more nearly does the impression resemble Indian ink, and the fitter it is for imitating drawings But very fine grains have several disadvantages for they are apt to come off before the aqua fortis has lain on long enough to produce the desired depth, and as the plate is not corroded so deep, it sooner wears out in printing whereas coarser grains are firmer, the acid goes deeper, and the plate will throw off a great many more impressions The reason of all this is evident, when it is considered, that in the fine grains the particles are small and near to each other, and consequently the aquafortis, which acts laterally as well as downwards, soon undermines the particles and causes them to come off If left too long on the plate, the acid would eat away the grain entirely

On these accounts, therefore, the moderately coarse grains are more sought after, and answer better the purpose of the publisher, than the fine grains which were formerly in use

Although there are considerable difficulties in laying properly the aquatint grain, yet the corroding the copper, or biting in, so as to produce exactly the tint required, is still more precarious and uncertain All engravers allow that no positive rules can be laid down by which the success of the process can be secured, nothing but a great deal of experience and attentive observation can enable the artist to do it with any degree of certainty

There are some hints, however, which may be of considerable importance to the person who wishes to attain the practice of this art

It is evident, that the longer the acid remains on the copper, the deeper it bites, and consequently the darker will be the shade in the impression It may be of some use, therefore, to have several bits of copper laid with aquatint ground of the same kind that is to be used in the plate, and to let the aquafortis remain for different lengths of time on each, and then to examine the tints produced in one, two, three, four minutes, or longer Observations of this kind frequently repeated, and with different degrees of strength of the acid, will at length assist the judgment in guessing at the tint which is produced in the plate A magnifier is also useful to examine the grain, and to observe the depth to which it is bit It must be observed that no proof of the plate can be obtained till the whole process is finished

If any part appears to have been bit too dark, it must be burnished down with a steel burnisher, and this requires great delicacy and good management, not to make the shade streaky and the beauty and durability of the grain is always somewhat injured by it, so that it should be avoided as much as possible.

Those parts which are not dark enough must have a fresh grain laid over them, and be stopped round with varnish and subjected again to the aquafortis This is called re-biting, and requires peculiar care and attention The plate must be very well cleaned out with turpentine before the grain is laid on, which should be pretty coarse, otherwise it will not lie upon the heights only, as is necessary in order to pro-

duce the same grain If the new grain is different from the former, it will not be so clear, nor so firm, but rotten

We have now given a general account of the process of engraving in aquatinta, and we believe that no material circumstance has been omitted that can be communicated without seeing the operation But after all, it must be confessed that no printed directions whatever can enable a person to practise it Its success depends upon so many niceties, and attention to circumstances apparently trifling, that the person who attempts it must not be surprised if he does not succeed at first It is a species of engraving simple and expeditious, if every thing goes on well, but it is very precarious, and the errors which are made are rectified with great difficulty

It seems to be adapted chiefly for imitations of sketches, washed drawings, and slight subjects, but does not appear to be at all calculated to produce prints from finished pictures, as it is not susceptible of that accuracy in the balance of tints necessary for this purpose Nor does it appear to be suited for book plates, as it does not throw off a sufficient number of impressions It is therefore not to be put into competition with the other modes of engraving If confined to those subjects for which it is calculated, it must be allowed to be extremely useful, as it is expeditious, and may be attained with much less difficulty than any other mode of engraving But even this circumstance is a source of mischief, as it occasions the production of a multitude of prints that have no other effect than that of vitiating the public taste

In the art before described, the artists experience much inconvenience from the quantity of fumes liberated by the action of the acid upon the copper, which, when the plate is large, is very great To remedy this inconvenience, the following arrangement, which we think well calculated to answer the purpose has been suggested by Mr Cornelius Varley, a young artist who distinguishes himself no less by his mechanical abilities than by the exquisite productions of his pencil in water colours —Get a frame made of common deal or any kind of wood, three or four inches deep, covered with a plate of glass, and open at one side, and let the side opposite to this have a round opening communicating, by means of common iron pipe, with the ash-pit of any little stove or other fire-place, shut up from all other access of air but what must pass through the pipe It is obvious that any fumes rising from a copper-plate laid under such a frame will be carried backward into the iron pipe by the current of air required to maintain combustion in the stove, and will by this means be carried up the chimney in place of being allowed to fly about in the apartment The pipe may be very conveniently used by carrying it down through the table to the floor, and so along to the place where the chimney may chance to stand, and when the frame is not wanted, the pipe at one of the joinings may be made to answer the purpose of a hinge by which to turn up the frame against the wall, where it may be secured, while out of use, by a button or any other contrivance Phil Mag No 90

AQUEDUCT See AQUÆDUCT

AQUEOUS *a* Partaking of the nature of water, or that abounds with it

AQUEOUS FUSION, in chemistry, is the solution of any substance in warm water, and is only effectual when employed upon saline matters, which it dissolves by entering into the constitution of their crystals This mode of fusion is distinguished from that in which fire is employed to melt a substance, and which is therefore called igneous fusion

AQUEOUS HUMOUR OF THE EYE, Humor aqueus The very limpid watery fluid which fills both chambers of the eye

A'QUEOUSNESS *s* (*aquositas*, Lat) Waterishness

AQUIFOLIUM, (*aquifolium*, from *acus*, a needle, and *folium*, a leaf, so called on account of its prickly leaf) Holly The leaves of this plant, Ilex aquifolium, foliis ovatis acutis spinosis of Linneus, have been known to cure intermittent fevers, and an infusion of the leaves, drank as tea, is said to be a preventive against the gout

AQUILA, a large handsome town of Naples, in Italy It is the see of a bishop and has a strong castle By an earthquake which happened here in 1700, 2,400 persons were destroyed, and 1,500 otherwise hurt Lat 42 20 N Lon 13 39 E

AQUILA, the Eagle, or the Vulture as it is sometimes called, is a constellation of the northern hemisphere, usually joined with Antinous It is one of the 48 old constellations, according to the division of which Hipparchus made his catalogue of the fixed stars, and which are described by Ptolemy The number of stars in Aquila are estimated at 29, of the first six magnitudes, in this order, 1 0 5 1 4 18 besides the 34 in Antinous

AQUILA ALBA One of the names given to calomel See CALOMELAS

AQUILARIA Eagle-wood a genus of the class and order decandria, monogynia Calyx campanulate, five-cleft, corolless, nectary campanulate, five cleft, bearing the stamens internally, capsule two-valved, two-celled, woody, seeds solitary The only known species is a Malacca-tree, from whose bark the Cochin-chinese manufacture paper

AQUILEGIA Columbine a genus of the class and order polyandria, pentagynia Calyxless, petals five, nectaries five, horned, one between each petal, capsules five, distinct Five species, south of Europe, Canada, Siberia The plant is thus denominated from *aqua*, water, and *lego*, to gather, from the shape of its leaves, which retain water The seeds, flowers, and the whole plant, of the species aquilegia vulgaris, nectariis incurvis of Linneus, have been used medicinally, the first in exanthematous diseases, the latter chiefly as an antiscorbutic Though retained in several foreign pharmacopœias, their utility appears to be forgotten in this country

AQUILEIA, in ancient geography, an ancient and large city of Italy, situate on the sea-coast at the entrance of the Sinus Tergestinus, or gulf of Trieste

AQUILICIUM, in Roman antiquity, a sacrifice offered in time of drought, to obtain rain

A'QUILINE *a* (*aquilinus*, Latin) Resembling an eagle, when applied to the nose, hooked (*Dryden*)

AQUILO, is used by Vitruvius for the north-east wind, or that which blows at 45° from the north toward the east point of the horizon —The poets gave the name aquilo to all stormy winds dreaded by the mariner

AQUILUS, among the ancients, a dark colour approaching nearly to black

AQUIMINARIUM, a vessel wherein the Romans carried holy water

AQUINAS (St Thomas), called the Angelical Doctor, of the noble family of Aquino, and descended from the kings of Sicily and Arragon, was born in the castle of Aquino, in Italy, about 1224 He entered into the society of the preaching friars at Naples, much against the inclination of his parents, who endeavoured to recover him, but in vain In 1244 he went to Paris, and from thence to Cologne, where he attended the lectures of Albertus Magnus He afterwards returned to Paris, and read lectures on the book of sentences with applause In 1255, he was created D D and about 1263 went to Rome, and after teaching divinity in various universities, he settled at Naples, and obtained a pension from the king Here he devoted himself to study and religious exercises, and refused the archbishopric of Naples, which was offered him by pope Clement IV In 1274, he was sent for to assist at the second council of Lyons, but died on the journey, at the monastery of Fossanova, near Terracina, aged 50 The authority of Aquinas has always been very high in the Roman church He was canonized by pope John XXII in 1323 His works, making 17 vols folio, have been printed several times, and at several places

AQUINO, a town of Naples, in Italy It is a bishop's see, but being almost ruined, consists now of about 30 houses This was the birth-place of Juvenal, the celebrated Roman satyrist, and Thomas Aquinas, the famous school-man Lat 41 36 N Lon 13 50 E

AQUO'SE *a* (from *aqua*, Lat) Watery, having the qualities of water

AQUO'SITY *s* (from *aquose*) Wateriness

AQUULA, (*aquula*, dim of *aqua*) A small quantity of very fine and limpid water, thus it is applied to the pellucid water, which distends the capsule of the crystalline lens, and the lens itself

A R anno regni, that is, in the year of the reign

ARA THURIBULI, the Altar of incense, in astronomy, a southern constellation, not visible in our hemisphere, consisting of 9 stars ranged thus; 0 0 1 6 1 1

ARABESQUE, or ARABESK, something done after the manner of the Arabians

ARABESQUE, GROTESQUE, and MORESQUE, are terms applied to such paintings, ornaments of freezes, &c wherein there are no human or animal figures, but which consist wholly of imaginary foliages, plants, stalks, &c.

ARABIA, one of the most considerable countries of Asia, is bounded on the west by the Red Sea, the isthmus of Suez, Palestine, and Syria, on the north by the Euphrates, on the east by the gulf of Persia and the sea, and on the south by the straits of Babelmandel and the sea Europeans have divided it into three parts, named from their supposed qualities, Arabia Deserta, Arabia Petræa, and Arabia Felix Arabia extends from lat 12 30 to 31 30 N and from lon 52 to 77 E Ferro, about 1350 miles from N to S and 1620 from E to W In some provinces of Arabia, the heat is excessive, but in this country, as in most others, the varying degrees of elevation, the relative situations of places, and the nature of the soil, occasion considerable varieties of temperature In the deserts, diversified here and there only by bare rocks, and in these flat plains, there is nothing to soften the force of the sun s rays, but all vegetables are burnt up, and the soil is every where reduced to sand In the interior country the temperature of the atmosphere is very different The greater ranges of lofty mountains attract vapours, and these falling down in plenteous rains, cool the air and quicken vegetation The cold occasioned by the height of the country produces falls of snow, but this never lie long upon the ground The rainy seasons which are regular in the countries between the tropics, are diversified here

The product of Arabia is aloes, cassia spike nard, frankincense, myrrh, manna, and other valuable gums, cinnamon, pepper, cardamom dates, oranges, lemons, pomegranates fig and other fruits, honey and wax in plenty and in their seas, they have great quantities of the best coral and pearls In Arabia, are abundance of all the domestic animals common in hot countries

Of all their domestic animals, it is well known that the Arabians put the greatest value on their horses Of these they have two great branches, the Kadischi, whose descent is unknown, and the Kochlani, of which a written genealogy has been kept for two thousand years The Kadischi are in no better estimation than our European horses, and are usually employed in bearing burthens, and in ordinary labour The Kochlani are reserved for riding solely They are highly esteemed, and consequently very dear They are said to have derived their origin from king Solomon s studs however this may be, they are fit to bear the greatest fatigues, and can pass whole days without food They are also said to show uncommon courage against an enemy it is even asserted, that when a horse of this race finds himself wounded, and unable to bear his rider much longer, he retires from the fray, and conveys him to a place of security If the rider falls upon the ground, this horse

remains beside him, and neighs till assistance is brought

ARABIA DESERTA, now called BERII ARBISTAN, and BERIARA, is bounded on the east by Diarbekir and the Persian province of Irak, on the north by Syria and the river Euphrates, on the west by Palestine and Arabia Petræa, and on the south by Arabia Felix This country is for the most part desert, being intersected almost every where by high barren mountains, and many of its plains nothing but great sands and heaths, through some of which neither men, beasts, birds, trees, grass, or pasture, are to be seen, the lands, however, that lie to the east along the river Euphrates, afford both plants and food for the inhabitants of some cities and towns seated on that part, and there are some plains and valleys that feed great numbers of sheep, goats, and other small cattle, which love to brouze upon such dry lands, but larger cattle, except camels, can find here no subsistence The method of the inhabitants of the desert is to seek after fresh pastures near rivers, lakes, or other places where they can find water for themselves and cattle, and when they have cleared the ground, to look out for another

ARABIA PETRÆA, or the STONY, the most western of all the Arabias, is bounded on the north by Palestine, on the east by Arabia Deserta and part of Arabia Felix, on the south by Arabia Felix, and on the west by the Red Sea and the isthmus of Suez, its extent from north to south computed to be 180 miles, and from east to west 150 It is called Petræa, or Stony, from its rocks, though some rather derive it from Petra, its ancient capital, now commonly supposed to be Harach, or Horac, lying on the isthmus, near the frontiers of Egypt Though, in most respects, it much resembles Arabia Deserta for its stony, sandy, and barren ground, yet it yields, in some parts, sufficient nourishment for cattle, whose milk and camel s flesh is the chief food of its inhabitants There are some other parts which are quite uninhabited and impassable

ARABIA FELIX, or THE HAPPY, by far the most considerable of the three, is called by the inhabitants Yeman, or Yaman, it was called Felix, or Happy, according to Ammianus Marcellinus, because it abounded in corn, cattle, vines, and odoriferous spices of all kinds It was also called Sacred, on account of the fine gums and aromatic woods employed in sacrifices, which it produced —Felix, or Happy, is, according to Niebuhr, a title unknown to the Arabians, who divide the country into six provinces, namely, viz Hedjas, Yemen, Hadramaut, Oman, Lachsa, or Hadsjar, and Nedsjid, the principal cities are Mecca, Medina, Mocha, Loheia, &c

ARABIC, GUM, (*gummi arabicum*, so called from its being brought from Arabia) This gum exudes, in a liquid state, from the bark of the trunk of the Mimosa nilotica of Linnéus, (mimosa, spinis stipularibus patentibus, foliis bipinnatis partialibus extimis glandula interstinctis, spicis globosis pedunculatis,) in a similar manner to the gum which is found upon the cherry trees in this country That of a pale yellowish colour is most esteemed Gum arabic is neither soluble in spirit nor in oil, but in twice its weight of water it dissolves into a mucilaginous fluid, of the consistence of a thick syrup, and in this state answers many useful pharmaceutic purposes, by rendering oily, resinous, and pinguious substances miscible with water The glutinous quality of gum arabic renders it preferable to other gums and mucilages as a demulcent in coughs, hoarsenesses, and other catarrhal affections It is also very generally employed in ardor urinæ, diarrhœas, and calculous complaints

ARABICI, a sect who sprung up in Arabia about the year 207, whose distinguishing tenet was, that the soul died with the body, and also rose again with it Eusebius, lib vi c 38, relates, that a council was called to stop the progress of this rising sect and that Origen assisted at it, and convinced them so thoroughly of their error that they abjured it

ARABIS, bastard tower mustard, or wall-cress a genus of the class and order tetradynia, siliquosa Nectariferous glands four, one within each leaf of the calyx, oblong, scale like, reflected, calyx closed, two of the leaves gibbous at the base, silicle linear, swelling at the seeds, entire and capitate at the tip Twenty-one species, chiefly American and Alpine plants The following are natives of our own country, 1 a thaliana, found on old walls 2 a stricta, on rocks and cliffs 3 a turrita, in Cambridgeshire and the neighbouring counties

ARABIST *s* One skilled in the language and learning of the Arabians

A'RABLE *a* (from *aro*, Lat) Fit for the plough, fit for tillage (*Dryden*)

ARAC See ARRACK

ARACAN, the capital of a small kingdom of the same name, lying to the N E of the bay of Bengal Lat 20 38 N Lon 93 10 E

ARACHIS Ground nut a genus of the class and order diadelphia, decandria Calyx two-lipped, corol reversed, filaments all united, legume gibbous swelling at the seeds, veined, coriaceous The only known species is of Indian birth, exhibiting two varieties

ARACHNE, of Colophon, daughter to Idmon, a dyer, so skilful in working with the needle, that she challenged Minerva, to a trial of skill She represented on her work the amours of Jupiter with Europa, Antiope, Leda, Asteria, Danae, Alcmena, though her piece was masterly, she was defeated by Minerva, and hanged herself in despair, and was changed by the goddess into a spider

ARACHNOID Cobwebbed Covered with a thick interwoven pubescence, resembling a cobweb Leaf, peduncle, calyx

ARACHNOID MEMBRANE (*membrana arachnoidea*, from ἀράχνη, *a spider*, and εἶδος, *likeness*, so named from its resemblance to a spider's web) 1 A delicate membrane of the brain, situated between the dura and pia mater, and surrounding the cerebrum, cerebellum, me-

dulla oblongata, and medulla spinalis 2 The crystalline lens and vitreous humour of the eye.

ARÆOMETER, an instrument wherewith to measure the density or gravity of fluids The aræometer, or water-poise, is usually made of glass, consisting of a round hollow ball, which terminates in a long slender neck hermetically sealed at top there being at first as much quicksilver put into it as will serve to balance or keep it swimming in an erect position The stem, or neck, is divided into degrees or parts which are numbered, to shew, by the depth of its descent into any liquor, the lightness or density of it for that fluid is heaviest in which it sinks least, and lightest in which it sinks deepest

Another instrument of this kind is described by Homberg of Paris, in the Memoirs of the Acad of Sciences for the year 1699, also in the Philos Trans No 262, where a table of numbers is given, expressing the density of various fluids, as determined by this instrument both in summer and winter By this table it appears that the density, or specific gravity of quicksilver and distilled water, in the two seasons, were as follow, viz

in summer as	13 61 to 1,
in winter as	13 53 to 1,

and the medium of these two is as 13 57 to 1

See also the Philos Trans vol 36, or Abridg vol 6, for the description and use of another new aræometer, and Gregory's Mechanics, book III ch 2 for the description and theory of the ingenious aræometer of De Parcieux Other instruments for the same purpose will be described under the word HYDROMETER

ARÆOMETRY, the science of measuring the lightness and density of fluids —See the Philos Trans vol 68, for an essay on aræometry, &c

ARÆOSTYLE, in architecture, a term used by Vitruvius, to signify the greatest interval which can be allowed between columns

ARAFAH, the ninth day of the last month of the Arabic year, named Dhoulhegial, on which the pilgrims of Mecca perform their devotions on a neighbouring mountain called Arafat.

ARAFAT, or GIBEL EL ARAFAT, a mountain near Mecca, where great numbers of pilgrims resort every year Certain stones are placed as boundaries to the sacred place Here the pilgrims, who are clad in robes of humility and mortification, earnestly beg the remission of their sins; imaums, or priests, then pronounce a blessing upon them in a most solemn manner, and call them by the honourable title of Hadgees

ARAHUM, or HARAHUM, in ancient writers, denotes a place consecrated or set apart for holy purposes.

ARAL, a lake of Asia, lying on the E of the Caspian sea, from which it is distant above miles It is about 300 miles long, and in aces 150 broad

LIA Berry-bearing angelica a genus class and order pentandria pentagynia Flowers in an umbellet, with an involucre calyx five-toothed, superior, corol five petalled berry five-seeded Ten species, of which some have entire, others lobed, and others decompound and more than decompound leaves They are natives of India, West Indies, or America

ARAM (Eugene), a man of considerable erudition, remarkable for his unhappy fate, and the singular circumstances that occasioned and attended it, was born at Ramsgill, a little village, in Netherdale, Yorkshire, in the year 1704 He was removed, when very young, together with his mother, to Skelton, near Newby and when he was five or six years old, his father making a little purchase in Bondgate near Rippon, his family went thither He was there sent to school, where he learned to read the New Testament in English, which was all he was ever taught, except that, some considerable time after, he was under the tuition of the reverend Mr Alcock of Burnsal, for about a month When he was about thirteen or fourteen years of age, he went to his father at Newby, and attended him in the family there, till the death of sir Edward Blackett It was in the house of this gentleman, to whom his father was gardener, that his propensity to literature first appeared He was, indeed, always of a solitary disposition, and uncommonly fond of retirement and books, and here he enjoyed all the advantages of leisure and privacy He applied himself at first chiefly to mathematical studies, in which he made a considerable proficiency At about sixteen years of age, he was sent to London to the house of Mr Christopher Blackett, whom he served for some time in the capacity of book-keeper After continuing here a year or more he was taken with the small-pox and suffered severely under that distemper He afterwards returned into Yorkshire, in consequence of an invitation from his father, and there continued to prosecute his studies, but found in polite literature much greater charms than in the mathematics, which occasioned him now chiefly to apply himself to poetry, history, and antiquities After this he was invited to Netherdale, where he engaged in a school and married But his marriage proved an unhappy connection, for to the misconduct of his wife he afterwards attributed the misfortunes that befel him In the mean while, having perceived his deficiency in the learned languages, he applied himself to the grammatical study of the Latin and Greek tongues, after which he read, with great avidity and diligence, all the Latin classics, historians, and poets He then went through the Greek Testament, and, lastly, ventured upon Hesiod, Homer, Theocritus Herodotus, and Thucydides, together with all the Greek tragedians In 1734, William Norton, esq a gentleman who had a friendship for him, invited him to Knaresborough Here he acquired the knowledge of the Hebrew, and read the Pentateuch in that language In 1744 he returned to London, and served the reverend Mr Painblanc, as usher in Latin

and writing, in Piccadilly, and, with this gentleman's assistance, he acquired the knowledge of the French language He was afterwards employed, as an usher and tutor, in several different parts of England, during which time he became acquainted with heraldry and botany He also ventured upon Chaldee and Arabic, the former of which he found easy from its near connection with the Hebrew He then investigated the Celtic, as far as possible, in all its dialects, and having begun to form collections, and made comparisons between the Celtic, the English, the Latin, the Greek, and the Hebrew, and found a great affinity between them, he resolved to proceed through all these languages, and to form a comparative lexicon But in the midst of these learned labours and inquiries, it appears that Aram committed a crime, which could not naturally have been expected from a man of so studious a turn, and which is the more extraordinary, as the inducement that led him to it is said to have been only gain, though he himself afterwards assigned a different motive. On the 8th of February, 1744, 5, he murdered Daniel Clark, a shoemaker, in conjunction with whom, and another person, he seems before to have been concerned in some fraudulent practices The murder, however, was concealed near fourteen years, and then was discovered by a skeleton being accidentally found, which was supposed to be that of Clark This was a mistake, but it led to a discovery of the whole transaction, and Aram's wife, from whom he had separated a considerable time, was a principal evidence against him When he was apprehended on suspicion of this murder, he was usher of a school at Lynn in Norfolk He was brought from thence to York-castle, and on the 3d of August, 1759, was tried at the county-assizes for the murder He was found guilty on the testimony of Richard Houseman, corroborated by that of his own wife, and other circumstantial evidence After his conviction, he confessed the justice of his sentence, but made an attempt upon his own life, by cutting his arm in two places with a razor, which he had concealed for that purpose By proper applications, he was brought to himself, and, though weak, was conducted to the place of execution, where, being asked if he had any thing to say, he replied, in the negative He was immediately after executed, and his body being conveyed to Knaresborough forest, he was there hung in chains, pursuant to his sentence

ARANEA Spider a genus of the class and order insecta, aptera Mouth with short, horny jaws, the lip rounded at the tip, feelers two, incurved, jointed, and very sharp at the end, those of the male clavate, antennaless, eyes eight, rarely six, legs eight, abdomen ovate, villous, and furnished at the tip with textorial papillæ A hundred and twenty-three species, chiefly inhabitants of Europe and America which may be usefully thus subarranged.

A Eyes placed

B Eyes

C Eyes

D Eyes

E Eyes

F Eyes

G Eyes

H Eyes

I Eyes

K Eyes

L Eyes

M Eyes

N Eyes

O Eyes

P Eyes number and position unknown (See Nat Hist pl XXII) In every stage of their existence these insects prey with the most savage ferocity upon all other insects they can overcome, and even upon one another From the papillæ at the end of the abdomen they throw out at pleasure a number of fine threads, which they unite in various ways for the purpose of entangling their prey They exfoliate their old skin every year, which is performed by suspending themselves in some solitary corner, and creeping out of it The younger ones have the power of flight, and in the autumn mount in the air to a great ascent, to perform which they probably climb some high eminence and are wafted about by the winds, filling the atmosphere with their fine threads They are infested by the sphex and ichneumon 1 The largest European spider is the a diadema reddish brown, abdomen gibbous and marked with white drop-shaped spots in the form of a cross It is often met with in trees in our own country, and is a very beautiful insect 2 The a aquatica, of a brown hue with cinereous ovate abdomen, the back marked with two imprinted dots, is found in the fresh water lakes of Europe, where it dives to the bottom in search of its food within the curious contrivance of a globule of air formed by itself, and takes up its winter quarters in a forsaken shell, the aperture of which it barricades with a web 3 A avicularia Thorax orbicular, convex, with a transverse central excavation, inhabits South America, among trees, where it preys upon the larger insects, and even small birds, dropping into their nests, and sucking their blood and eggs It is of so enormous a size that its fangs are equal to the talons of a hawk, and its eyes capable of being

set in the manner of lenses, and used as microscopes.

ARA'NEOUS *a* (from *aranea*, Lat a cobweb.) Resembling a cobweb (*Derham*)

ARARAT, the name of the mountain on which Noah's ark rested, after the abatement of the waters of the universal deluge There are two opinions concerning the situation of this mountain According to one opinion the ark rested on that part of the mountains now called Ararat in Armenia, near the spring of the Tigris, and styled by Latin writers the Gordiæan Mountains According to the other, the ark rested on the top of mount Caucasus, in the confines of Tartary, Persia, and India The former opinion is the most probable, (see Wells s Geog Old Test I 30,) we may therefore state the situation of Ararat, in about lat 38 N Lon 46 W

ARATEIA, in antiquity, a yearly festival celebrated at Sicyon on the birth-day of Aratus

ARA'TION *s.* (*aratio*, Lat) The act or practice of ploughing

ARATO-BAFABEN, a fixed star of the 2d mag in Draco

A'RATORY *a* (from *aro*, Lat to plough) That contributes to tillage

ARATUS, a Greek poet, was born in Cilicia about 300 B C His poem entitled Phenomena, which is still extant, shews him to have been an astronomer, as well as a poet It was translated by Cicero into Latin, and St Paul quotes a passage from it in his speech to the Athenians Grotius published it in Greek and Latin at Leyden in 1600, 4to besides which there are several other editions

ARAUCARIA In botany, a genus of the class and order dioecia, monadelphia Male calyx, scales of an ament, terminated by a leaflet, corolless, anthers ten or twelve without filaments Fem calyx an ament with many germs, corolless stigma two-valved unequal, seeds numerous in a roundish cone The only known species is a native tree of Chili

ARAW, a large town of Argow, in Switzerland, remarkable for its church, its fountain, and the fertility of its soil Lat 47 20 N Lon. 8 0 E

A'RBALIST *s* (*arcus* and *balista*) A crossbow (*Camden*)

ARBELLA, or IRBIL, a city of Curdistan, where Alexander the Great fought the last decisive battle with Darius III which put an end to the Persian empire This happened in the year of the world 3724 Lat 35 5 N Lon. 42 35 E

ARBITER, in the civil law, implies a judge nominated by the magistrate, or chosen voluntarily by two contending parties, in order to decide their differences.

A'RBITRABLE *a* (from *arbitror*, Latin) Arbitrary, depending upon the will (*Spel*)

ARBI'TRAMENT *s* (from *arbitror*, Lat) Will, determination, choice (*Milton*)

A'RBITRARILY *ad* (from *arbitrary*) With no other rule than the will, despotically, absolutely (*Dryden*)

A'RBITRARINESS *s* (from *arbitrary*) Despoticalness, tyranny (*Temple*)

ARBITRA'RIOUS *a* (from *arbitrarius*, Latin) Arbitrary, depending on the will (*Norris*)

ARBITRA'RIOUSLY *ad* (from *arbitrarious*) Arbitrarily, according to mere will and pleasure (*Glanville*)

A'RBITRARY *a* (*arbitrarius*, Latin) 1 Despotick, absolute (*Prior*) 2 Depending on no rule, capricious (*Brown*)

To A'RBITRATE *v a* (*arbitror*, Latin) 1 To decide, to determine (*Shakspeare*) 2 To judge of (*Milton*)

To A'RBITRATE *v n* To give judgment (*South*)

ARBITRATION, is where the parties, injuring and injured, submit all matters in dispute, concerning any personal chattels or personal wrong, to the judgment of two or more arbiters or arbitrators, who are to decide the controversy If these do not agree, it is usual for another person to be called in as umpire, to whose sole judgment it is then referred, or frequently there is only one arbitrator originally appointed The decision, in any of these cases, is called an award, and thereby the question is as fully determined, and the right transferred or settled, as it could have been by the agreement of the parties or the judgment of a court of justice

ARBITRATION, or COMPARISON OF EXCHANGE, in arithmetic, determines the method of remitting to, or drawing upon, foreign places, in such a manner as shall be most advantageous to the merchant

Arbitration is either Simple or Compound

Simple Arbitration respects three places only Here, by comparing the par of arbitration between a first and second place, and between the 1st and a 3d, the rate between the 2d and 3d is discovered, from whence a person can judge how to remit or draw to the most advantage, and to determine what that advantage is

Compound Arbitration respects the case in which the exchanges among three, four, or more places are concerned A person who knows at what rate he can draw or remit directly, and also has advice of the course of exchange in foreign parts, may trace out a path for circulating his money, through more or fewer of such places, and also in such order, as to make a benefit of his skill and credit and in this lies the great art of such negociations See Hutton s, Bonnycastle's, or Keith s Arithmetic

ARBITRA'TOR *s* (from *arbitrate*) 1 An extraordinary judge between party and party, chosen by their mutual consent (*Cow*) 2 A governour, a president (*Milton*) 3 He that has the power of prescribing to others without limit or control (*Addison*) 4 The determiner (*Shakspeare*)

ARBI'TREMENT *s* (from *arbitror*, Lat) 1 Decision, determination (*Hayward*) 2 Compromise (*Bacon*)

ARBOR is figuratively used in mechanics for the principal part of a machine, which serves to sustain the rest —It is also used for a spindle, or axis, whereon a machine turns, thus, arbor of a crane, a mill, a windmill, &c

ARBOR DIANÆ, or SILVER TREE, is the result of a curious experiment in chemistry, by which the branches and figure of a tree are represented by an amalgam of silver and mercury, which appear to vegetate in a very beautiful manner To obtain it, one part of silver, dissolved in nitrous acid to saturation, is mixed with twenty parts of clean water, and poured upon two parts of mercury When left standing quietly, the desired crystallization will take place after some time A cylindrical glass vessel is best suited for the purpose, and that the process may succeed it is necessary that the ingredients be in their utmost purity (*Gren*) See ARGENTUM

ARBOR MARTIS, an apparent vegetation of iron, resembling a natural plant It is formed by dissolving iron filings in diluted nitric acid, and adding to the solution a quantity of carbonate of potash in a deliquescent state, or what was formerly called oil of tartar per deliquium The mixture swells considerably, and is no sooner at rest than the branches spring out on the surface of the glass

ARBOR PLUMBI, is a beautiful vegetation of lead To form it, two drams of acetite of lead (sugar of lead) are dissolved in six ounces of distilled water, the filtered solution is poured into a cylindrical glass, and a thin roll of zinc being hung in it, the whole is left standing at rest The lead precipitates, adhering to the zinc in metallic leaves, in the form of a tree

ARBOR VITÆ 1 The cortical substance of the cerebellum so disposed, that, when cut traversely, it appears ramified like a tree, from which circumstance it is termed arbor vitæ 2 The tree so named, the leaves and wood of this tree, Thuya occidentalis, strobilis lævibus, squamis obtusis, of Linneus, were formerly in high estimation as resolvents, sudorifics, and expectorants, and were given in phthisical affections, intermittent fevers, and dropsies See THUYA

A'RBORARY *a* (*arborarius*, Lat) Belonging to a tree

ARBOREOUS (*arboreus*) stem Single, woody and permanent, as the trunk or bole of a tree Opposed to shrubby, undershrubby and herbaceous

ARBORESCENT (*arborescens*) stem From herbaceous becoming woody

A'RBORET *s* (*arbor*, Latin, a tree) A small tree or shrub (*Milton*)

A'RBORIST *s* (*arboriste*, Fr) A naturalist who makes trees his study (*Howel*)

A'RBOROUS *a* (from *arbor*, Lat) Belonging to a tree (*Milton*)

A'RBOUR *s* (from *arbor*, Lat a tree) A bower, a place covered with green branches of trees (*Dryden*)

A'RBUSCLE *s* (*arbuscula*, Lat) Any little shrub

ARBUSTIVA, (from *arbustum*, a shrub) The name of the thirty-ninth order, in Linnéus's Fragment of a Natural Arrangement, in Philosophia Botanica The same with Hesperideæ, in his Genera Plantarum n 19

A'RBUTE *s* (*arbutus*, Latin) Strawberry tree (*May*) See ARBUTUS

ARBUTHNOT (Dr John), was born in Kincardinshire, near Montrose, and was educated in physic at Aberdeen His talents and worth recommended him to the men of wit and learning of his day, and he entered into particular connection with Pope and Swift, with whom he joined in publishing several volumes of miscellanies, among which are the well-known Memoirs of Martinus Scriblerus, a satire of infinite humour on the abuses of human learning In 1715 he assisted Pope and Gay in the Three Hours after Marriage, a dramatic performance, which was brought upon the stage without success In 1727 he published Tables of ancient coins, weights, and measures, a work of great use, and real erudition In 1732 his valuable tract concerning the nature and choice of aliments appeared, which, the year after, was followed by his remarks on the effects of air on human bodies A constitutional asthma had distressed him at different periods of his life, and proved fatal to him in 1734

ARBUTUS Strawberry-tree a genus of the class and order decandria, monogynia Calyx five-parted, corol ovate, with a five-cleft mouth, pellucid at the base, berry superior, five celled, anthers with two pores Ten species scattered over the globe, of which the a unedo is the only plant indigenous to the British empire, and has been found on the banks of the lake of Killarney Many of the others are introduced into our gardens by cultivation

ARBUTUS, TRAILING See EPIGEA

ARBUTUS UVA URSI The systematic name for the officinal woolly headed burdock See UVA URSI

ARC *s* A segment, or part of the circumference of a circle or other curve See ARCH

ARC, Joan of See JOAN

ARCA In zoology, a genus of the class and order vermes, testacea There is some doubt whether it be not a tethys Its shell is bivalve, equivalve, hinge with numerous sharp teeth alternately inserted between each other Forty-three species, in some the margin is very entire, beak reflected, and in some again, the margin is crenate, beak recurved It is to be found in the seas of every quarter of the globe One of the most common to the European seas is the a nucleus, which is sometimes found fossile Size that of a hazel-nut, covered with an olivaceous skin under which it is white, within silvery shell unequally triangular, with very fine perpendicular striæ crossed by a few arched, transverse ones, depression behind the beak heart-shaped See plate IX

ARCADE, in architecture, any opening in the wall of a building formed by an arch

ARCADIA, in ancient geography, one of the six districts of Peloponnesus It has to the north Achaia, to the east Argos and Laconia, Messenia to the south, and Elis to the west. According to Pliny, the wine of this country cured barrenness in women, and inspired the men with rage, and the berries of the yew gathered there were so strong a poison, that whoever slept or took refreshment under that tree were sure to die In Strabo's time there were few cities remaining in it, most of them being destroyed in the Grecian wars Eustatius says, that the country was anciently called Pelasgia, from Pelasgos, who brought the people, from roots, herbs, and leaves of trees, to feed on acorns, especially beechmast, as Artemidorus observes, that the Arcadians usually lived on acorns It was also called Lycaonia, Gigantes, and Parrhasia (*Stephanus*) The Arcadians are greatly commended for their love of, and skill in, music

ARCADIA, a town of the above province, near the gulph of the same name Lat 37 24 N Lon 21 42 E

ARCANUM, (*arcanum*, a secret) A medicine whose preparation or efficacy is kept from the world, to enhance its value

ARCANUM CORALLINUM, red precipitate (red oxyd of mercury by nitric acid) in a mild state, rendered so by having spirit of wine burnt upon it

ARCANUM DUPLICATUM, or the DOUBLE SECRET, a name by which the substance now called sulphate of potash was formerly known

ARCANUM TARTARI, secret foliated earth, digestive salt of Sylvius, former names of acetite of potash, which see

ARCAS, in astronomy, a name sometimes given to Arcturus

ARCESILAUS, a celebrated Greek philosopher, about 300 years before the Christian æra, was born at Pitane in Eoli He founded the second academy, which is called the second school He was a man of great erudition, and well versed in the writings of the ancients He was remarkable for the severity of his criticisms, but nevertheless he knew how to accommodate himself to the age, and pursue the allurements of pleasure He had a great number of disciples His doctrines were different in several respects from those of the ancient school and perhaps he was led into this diversity of opinions by many capital errors in the ancient school, such as the incredible arrogance of the dogmatists, who pretended to assign causes for all things, the mysterious air they had thrown upon the doctrine of ideas, the entirely discarding the testimony of the senses, the objections of the Pyrrhonists, who now began to broach their opinions, the powerful opposition of the Stoics and Peripatetics, who discovered the feeble parts of the academic philosophy These might have given cause to reform the ancient school, and to found a new one The middle school, therefore, laid it down as a principle, that we could know nothing, nor even assure ourselves of the certainty of this position, from whence they inferred, that we should affirm nothing, but always suspend our judgement They advanced, that a philosopher was able to dispute upon every subject, and bring conviction with him, even upon contrary sides of the same question, for there are always reasons of equal force both in the affirmative and negative of every argument According to this doctrine, neither our senses, nor even our reason, are to have any credit, and therefore, in common affairs, we are to conform ourselves to received opinions

ARCH, ARC, ARCUS, in geometry, a portion of any curve line, as of a circle, an ellipse, an hyperbola, a cycloid, &c

It is by means of circular arches that angles are readily measured, the arch being described from the angular point as a centre For this purpose every circle is supposed to be divided into 360 degrees, or equal parts, with their subdivisions, minutes, seconds, &c and an arch, or the angle it subtends and measures is estimated according to the number of degrees it contains Circular and other arcs are also of very great use in finding fluents

ARCHES CONCENTRIC, are such as have the same centre

ARCHES, EQUAL, are such arches of the same or equal circles, as contain the same number of degrees Hence, in the same or equal circles, equal chords subtend equal arches —And hence, again, arches intercepted between parallel chords are equal

Similar arches, of unequal circles, &c are such as contain the same number of degrees, or the like parts of their respective whole circles Hence, in concentric circles any two radii cut off or intercept similar arches Similar circular arches are proportional to the radii of their respective circles or to their whole circumferences —Similar arches of other corresponding and like curves are also like parts of the wholes, or determined by like parts similarly posited

To investigate the length of the arch of any curve Let x, as usual, represent the abscis, y the ordinate of the arc z of any curve whatever Put $\dot{z} = \sqrt{\dot{x}^2 + \dot{y}^2}$, then, by means of the equation of the curve, find the value of $\dot{x}$ in terms of y, or of $\dot{y}$ in terms of x, and substitute that value instead of it in the above expression hence, taking the fluents they will give the length of the arc z in terms of x or y For numerous examples, see Dr Hutton's Mensuration See also Emerson's, Holliday's, Rowe's, and Simpson's Fluxions, and Landen's Memoirs

ARCH DIURNAL, and NOCTURNAL, of the sun, in astronomy, are parts of a circle parallel to the equator; the first being that which is described by the sun while above the horizon, the latter that described while he is under the horizon A table of semidiurnal arcs is useful in finding the rising and setting of sun and stars See White's Ephemeris, p 40, and Vince's Astron vol II p 393 and 466

ARC OF PROGRESSION and RETROGRA-

DATION, of a planet, those arches of the ecliptic which it appears to describe while its motion is direct and retrograde respectively

ARCH BETWEEN THE CENTRES, in eclipses, an arch passing from the centre of the earth's shadow, perpendicular to the moon's orbit, meeting her centre at the middle of an eclipse

ARC OF VISION, that which measures the sun's depth below the horizon, when a star, before hid by his rays, begins to appear again The measures of this arc for various bodies are nearly as follows Mercury 10°, Venus 5°, Mars 11½°, Jupiter 10°, Saturn 11° Stars of 1st mag 12°, 2d mag 13°, 3d mag 14°, 4th mag 15°, 5th mag 16°, and 6th mag 17° But these measures are subject to slight variations

ARCH, in building, is an artful disposition of several stones, or bricks, or other suitable materials, generally in a bow-like form, by which their weight produces a mutual pressure and abutment, so that they not only support each other, and perform the office of an entire lintel, but may be extended to any width, and made to carry the most enormous weights

ARCHES are used in large intercolumniations of spacious buildings, in porticoes, both within and without temples, in palaces, halls, theatres, &c Also in covering cellars and powder magazines, gates windows, &c And for the support of bridges and aqueducts They are supported by piers, butments, imposts, and the like

Arches are constructed of various forms, and are designated by various names according to their figure As semicircular arches, those which make an exact semicircle scheme or skene arches, those which are less than semicircles, containing generally from 60 to 120 degrees elliptical arches, which usually consist of semiellipses cycloidal, catenarian, groined, &c Besides gothic and pointed arches, which will be spoken of farther on

As the strength and coherence of arches is of the utmost importance to the duration of any edifice of which they form a part, we trust we shall perform an acceptable service to many of our readers, by entering a little at large into the history and consideration of the principles which are of the greatest utility in this extensive department of the art of building

Arches are indeed the greatest performance of the masonic art, and at the same time the most difficult and delicate When we reflect on the immense quantity of materials thus suspended in the air, and compare this with the small cohesion which the firmest cement can give to a building, we shall be convinced that it is not by the force of the cement that they are kept together they stand fast in consequence of the balance of all their parts In order, therefore, to erect them with a well-founded confidence of their durability, this balance should be well understood and judiciously applied It is manifest that much depends, not only on the form of the arch, but on the disposition of the materials Sir Henry Wotton when considering this subject, says, First, All matter, unless impeded, tends to the centre of the earth in a perpendicular line — Secondly, All solid materials, as bricks, stones, &c in their ordinary rectangular form, if laid in numbers, one by the side of another, in a level row, and their extreme ones sustained between two supporters, those in the middle will necessarily sink, even by their own gravity, much more if forced down by any superincumbent weight To make them stand, therefore, either their figure or their position must be altered —Thirdly, Stones, or other materials, being figured cuneatim, or wedge like, broader above than below, and laid in a level row, with their two extremes supported as in the last article, and pointing all to the same centre, none of them can sink, till the supporters or butments give way, because they want room in that situation to descend perpendicularly But this is a weak structure, because the supporters are subject to too much impulsion, especially where the line is long, for which reason the form of straight arches is seldom used, excepting over doors and windows, where the line is short and the side walls strong In order to fortify the work, therefore, we must change not only the figure of the materials, but also their position —Fourthly, If the materials be shaped wedgewise, and be disposed in form of an arch, and pointing to some centre, in this case neither the pieces of the said arch can sink downwards, for want of room to descend perpendicularly, nor can the supporters or butments suffer much violence, as in the preceding flat form for the convexity will always make the incumbent rather rest upon the supporters, than thrust or push them outwards

It was towards the end of the 17th century when the Newtonian mathematics opened the road to true mechanical science, that the construction of arches began to engage the attention of able mathematicians Dr Hooke first suggested a principle that the figure into which a chain or rope, perfectly flexible, will arrange itself when suspended from two hooks, is, when inverted, the proper form for an arch composed of stones of uniform weight this he affirmed on the principle that the figure which a flexible festoon of heavy bodies assumes, when suspended from two points, is, when inverted, the proper form for an arch of the same bodies, touching each other in the same points, because the forces with which they mutually press on each other in this last case, are equal and opposite to the forces with which they pull at each other in the case of suspension This principle is just, and may, with due precautions, be extended to every case which can be proposed

Soon after Dr Hooke had laid down this principle, M de la Hire submitted the problem of the equilibrium of vaults to the laws of mechanics and in his Traité de Mécanique, published in 1695, founded upon the theory of the wedge the proportion according to which we must cause the absolute weight of the voussoirs to be augmented from the key of the

arch to the imposts, in a semicircular arch The historian of the French academy of sciences remarked, under the year 1704, that Parent had determined according to the same principles, but solely by points, the figure which the extrados of a vaulted arch ought to have when the intrados is a semicircle, and farther that he had given the measure of the thrust of such an arch against the piers or abutments we know not whether this solution has ever been printed

The two illustrious brothers James and John Bernoulli, with Huygens and Leibnitz, having resolved, in 1691, the problem of the catenary, the geometers were not long before they perceived that the figure of that curve when inverted, is that which should be given to an arch composed of voussoirs infinitely small and uniformly heavy, in order that all its parts may be in equilibrio David Gregory was the first who remarked this identity, in his ingenious dissertation on the catenary, published in the Philosophical Transactions, for the year 1707 He also observed that when arches of some thickness were supported in equilibrio, it was because in their shape some catenary was included, meaning obviously by the words "some catenary," some figure of similar nature with a catenary, but not supposed indefinitely thin in the vertical direction, such as the catenary formed with bits of chains, as described lower down in this article

In the posthumous memoirs of James Bernoulli there are two direct solutions of the problem, founded on two different methods of considering the action of the voussoirs, the first is clear, simple, exact, and conducts readily to the true equation of the curve, which is a species of inverted catenary, the second has need of a little correction, which the author would undoubtedly have made himself had he lived to revise his memoir, and which Cramer, the editor of his works, has indicated by means of this correction may readily be found the equation of the catenary

In the memoirs of the Academy of Sciences for the year 1712, la Hire, considering the problem of the thrust of arches, under a point of view indicated by some experiments, has given a solution, which, on account of the simplicity of the calculus and of the results it furnishes, was adopted with avidity by the majority of engineers and practical men He supposed that the arches whose abutments have not a sufficient thickness to sustain the thrust, fail or break asunder about 45 degrees above the imposts in consequence he regards the upper part of the arch as a wedge which tends to separate or to overturn the piers or the abutments, and he determines, by the theory of the wedge and the lever, the dimensions which they ought to have to resist an effort the same theory was likewise applied to domes

In the Essais et Recherches de Mathema[illegible] vol III, published by M. Parent, in [illegible] that author extended and modified his theory of which we have before spoken, so as to apply to equilibrated arches in general. And nearly the same principles were adopted by Couplet in the two parts of his memoir on the thrust of arches, published a few years after The first part, printed in the memoirs of the French Academy for the year 1729, treats of the push of arches and the thickness of their abutments, by considering the voussoirs as infinitely smooth, or as capable of sliding one over another, without experiencing any resistance from friction But as this hypothesis is not conformable to experiment, the second part of the memoir, inserted in the volume of the Academy for the year 1730, has for its object the same questions, assuming that the voussoirs have not the faculty of sliding over one another's surfaces, but that they may be raised and separated from one another by small motions of rotation This theory is applied principally to circular arches Couplet determines the proportion of the weights of the voussoirs, and the figure necessary to give to the extrados, with relation to a proposed intrados, but he has added very little to the theories of la Hire and Parent, and neither of them have treated the subject with the requisite generality and precision, as they relate either to theory or to practice Muller, Riou, Clarke, and some other English authors, adopted, in like manner, the theories of la Hire and Parent, with slight modifications

The volume of the French Academy for the year 1734, contains a memoir of Bouguer on the curve lines proper to form domes He shews that we may employ for that purpose an infinity of curves, at the same time that he points out the manner of choosing the most advantageous He supposes always that the voussoirs have their surfaces infinitely polished, and establishes upon this hypothesis the conditions of equilibration in every horizontal course of a vaulted dome But Bouguer has not given any method of determining the thrust of domes, nor has he examined the law of the forces which ought to act upon the voussoirs when the generating curve is subject ed to given conditions, though these are fruitful topics of curious and useful problems

In the year 1772, Dr Hutton published at Newcastle, a valuable little treatise on the Principles of Bridges, founded upon that hypothesis which establishes an equilibrium among all the vertical pressures of the whole fabric contained between the soffit of the arch and the roadway, thus making an equality at every point of the curve, between all the adjacent pressures, when reduced to the tangential directors, or those that are perpendicular to the curve This work is divided into five sections of which the 1st treats on the projects of bridges, containing a regular detail of the various circumstances and considerations that are cognizable in such projects the 2d treats on arches, demonstrating their various properties, with the relation between their extrados and intrados, and clearly distinguishes those curves which ought to be preferred in the construction of a bridge the 3d section treats of the piers, demonstrating their thickness neces-

sary for supporting any kind of an arch, springing at any height, both when part of the pier is supposed to be immersed in water, and when it is not in the 4th section is investigated the force of the water against the face of a pier, considered under different forms, and the best form for dividing the stream is pointed out and the 5th section contains a dictionary of the terms peculiar to the subject

About this time Mr Emerson gave some propositions relative to the theory of arches, in his Fluxions, and his Mechanics And in the year 1770, gave in his "Miscellanies," an essay on the construction of arches, as well as some investigations concerning domes, adducing at the same time various reasons for preferring the theory advanced by Dr Hutton, which in fact agrees completely with that which was suggested by Hooke and Gregory

About this time also, the subject of arches and domes was investigated in all its generality by M Bossut, who examined the principal circumstances relating to the pressure of these two kinds of vaults in two memoirs printed among those of the French Academy of Sciences, for the years 1774 and 1776 Also, the 7th volume of the works presented to the said academy, contains under the date of the year 1773, an able memoir of M Coulumb, on some problems relative to architecture among these problems are found those of the equilibrium of arches, which the author has treated by a method directed to practical utility

In 1785, Cit Mascheroni published at Bergamo a work entitled Nuove Ricerche sull equilibrio delle Volte, in which there are many curious propositions respecting the equilibrium of vaults, especially those of the dome kind, whether their bases are circular, elliptics, or polygonal This author acknowledges himself indebted to the enquiries of Bossut

In 1801 and 1804, were published A Dissertation on Arches, and a Supplement to that Dissertation, by Mr Atwood, in which the wedge theory of La Hire, Parent, and Couplet, is adopted without any essential change, though that theory has been exploded, as inadequate, for more than thirty years, being indeed explained by Emerson in his Miscellanies, for no other purpose than to condemn it, and to shew its uselessness

In the year 1802, M Bossut, having made a great number of reflections both theoretical and experimental, since his first essay, published a new edition of his Recherches sur l Equilibre des Voutes, in which he considers separately the equilibration of arches and of domes With regard to the former, he first gives the determination of the thickness of the piers and abutments, when the arch tends to break at given points of the haunches 2dly, he treats of the relations which should subsist between the forces acting upon the voussoirs, and the figure of the arch, so that the whole system may be in equilibrio and 3dly, of the figure which should be given to the lateral exterior face of the abutments, when they can only fail in horizontal courses In like manner, with respect to domes, he enters first upon the determination of the requisite thickness of the feet of a dome, to resist the pressure of the upper segment, considered as a detached body then he establishes the conditions of equilibrium between all the parts of a dome and lastly, the exterior figure of the feet or piers, to resist equally in every part a rupture in a horizontal direction This treatise, and that of Dr Hutton beforementioned, are certainly the most able and useful of any we have yet met with on this interesting subject

If an arch be constructed, according to Dr Hooke's principle, of an inverted arch of bodies which adhered at their points of contact, it will remain in equilibrio, but it will be such an equilibrium as will admit of no disturbance for when the festoon is set up as an arch, if a small weight be laid on any part of it, it will bring the whole to the ground, because the shifting of the points of contact will be just the contrary to what it should be to suit the new curve But if the same weight be laid on the same part of an arch similarly curved, but constructed with flat joints properly verging towards the centre of curvature, the whole will be sustained if the new curve still passes through the touching surfaces Hence, it appears, that the longer the joints are, the greater will be the stability of the arch, other circumstances being the same

When an arch has no tendency to break in one part rather than in another, it is called an arch of equilibration, and in arches of this nature, every particular figure of the extrados, or upper side of the wall above an arch, requires a peculiar curve for the under side of the arch itself, so that the incumbent pressure on every part may be proportional to the strength or resistance there we shall, therefore, now give a popular account of the general application of our assumed principle Suppose, then, it be required to ascertain the form of an arch which shall have the span AB (fig 2 pl 14) and the height F 8, and which shall have a roadway in the position CDE above it Let the figure ACDEB be inverted so as to form a figure A *c d e* B, let a chain of uniform thickness be suspended from the points A and B, and let it be of such a length that its lower point will hang at, or rather a little below, *f*, corresponding to F Divide AB into a number of equal parts, in the points 1, 2, 3, &c and draw vertical lines cutting the chain in the corresponding points 1, 2, 3, &c Then take pieces of another chain, and hang them on at the points 1, 2, 3, &c of the chain A *f* B This will alter the form of the curve Cut or trim these pieces of chain, till their lower ends all coincide with the inverted roadway *c d e* The greater lengths that are hung on in the vicinity of A and B will pull down these points of the chain, and cause the middle point *f* (which is less loaded) to rise a little, and thus bring it near to its proper height This process (for which we are indebted to De la Hire) will produce an arch of equilibration, but, as Dr Robison remarks, some farther considerations are necessary to make it exactly suit our purpose It is an arch of equilibration

for a bridge that is so loaded, that the weight of the arch stones is to the weight of the matter with which the haunches and crown are loaded, as the weight of the chain A f B, is to the sum of the weights of all the little bits of chain, very nearly. But this proportion is not known beforehand; we must, therefore, proceed in the following manner: adapt to the curve produced in this way a thickness of the arch-stones as great as are thought sufficient to ensure stability, then compute the weight of the arch stones, and the weight of the gravel or rubbish with which the haunches are to be filled up to the road-way. If the proportion of these two weights be the same with the proportion of the weights of chain, we may rest satisfied with the curve now found; but if different, it may easily be calculated, how much must be added equally to, or taken from, each appended bit of chain, in order to make the two proportions equal. Having altered the appended pieces accordingly, we shall get a new curve, which may perhaps require a very small trimming of the bits of chain to make them fit the road-way. This curve will be indefinitely near to the curve wanted. This method has been practised with success, and it is recommended to the mechanic, as any intelligent man, though ignorant of mathematics, may go through the process with little trouble, and it will give a very proper form for an arch under any conditions.

It would lead us too great a length were we to give the analytical investigations of the different cases which might arise: it appears, however, from the theory, that, in the hyperbolic arch, the extrados continually approaches nearer to the intrados, whereas in the circular and elliptic arches, it goes off continually farther from it, and in the parabola the two curves keep always at the same distance in the vertical direction.

But we must not neglect to inform the reader, that many facts have been adduced which shew great deviations from the legitimate results from the theory. For instance, circular arches commonly fail by the sinking of the crown and the rising of the flanks, while, according to the theory, in most cases, it ought to have been just the contrary. Still we do not mean to assert that the theory is erroneous: it is merely defective, leaving out circumstances which are of great importance; nay, it is probable the defects of the theory have arisen from the anxiety of mathematicians to make it perfect. It is supposed that the pressure on every part of the arch is vertical, but some loose materials, as gravel, earth, and rubbish, exert a kind of hydrostatical pressure laterally in the act of settling, and retain it afterwards. The arch-stones are supposed to be perfectly smooth or polished, and not to be connected by any cement, and therefore to sustain each merely by the equilibrium of their vertical pressure. The theory ensures this equilibrium, and this only, leaving unnoticed any other causes of mutual action. Though the ingenious mathematical theory of equilibrated arches is of considerable utility, yet an engineer must not regulate his operations by this theory alone, but must call to his aid other considerations. It will be particularly advisable to attend to the procedure of nature in the failure of an arch. The matter may be considered thus: straight lines can be drawn within the arch stones at A (fig. 3. pl. 14.) to B and D, and from those to C and E. Each of the portions ED, DA, AB, BC, resist as if they were of one stone, composing a polygonal vault EDABC. When this is overloaded at A, that point can descend in no other way than by pushing the angles B and D outwards, causing the portions BC, DE to turn round C and E. This motion must raise the points B and D, and cause the arch stones to press on each other at their inner joints *h* and *d*, thus producing a splintering at those joints, which indicates the total downfal by the rising of the flanks at B and D. That this is the process of nature has been verified by observation and experiment. Still, however, it appears difficult to point out the precise place where the tendency to break is most remarkable.

Mr Mylne the ingenious architect of Blackfriars bridge adopted a contrivance which determined this point with precision, by making it impossible for the overloaded arch to spring in any other place. Having thus confined the failure to a particular spot, he with equal art opposed a resistance which he believed to be sufficient: the present condition of that noble bridge, which does not in any place shew the smallest change of shape, proves that he did not mistake. Looking on this work as a most excellent specimen of masonic ingenuity, we shall briefly describe the supposed principles of its construction.

The span *k a* (fig. 1. pl. 14.) of the middle arch is 100 feet, its height OV is 40, and the thickness KV of the crown is 6 feet 7 inches. Its form is nearly elliptical, the part AVZ being an arch of a circle whose centre is C, and radius 56 feet, and the two lateral portions A *k* B and Z *a* E being arches described with a radius of 35 feet nearly. The thickness of the pier at *a b* is 19 feet. The thickness of the arch increases from the crown V to Y, where it is 8 or 9 feet. All the arch stones have their joints directed to the centres of their curvature. The joints are all joggled, having a cubic foot of hard stone let into each. By this contrivance the joints are kept from sliding, nor can any weight laid on the crown ever break the arch in that part, if the piers do not yield; for a straight line from the middle of KV to the middle of the joint YI is contained within the solid masonry, and does not even come near the joints of the arch-stones. Therefore the whole resists like one stone, and can be broken only by crushing it. The joint at Z is very nearly perpendicular to a line YF drawn to the outer edge of the foundation of the pier: this was intended to take off all tendency of the pressure on the joint *d* Z to overset the pier, for

equilibration, that this pressure is necessarily exerted perpendicularly to the joint, its direction passes through the fulcrum at F, round which it is thought the pier must turn in the act of oversetting This precaution was adopted, in order to make the arch quite independent of the adjoining ones, so that although any of them should fall this arch should run no risk

Still farther to secure the independence of the arch, the following construction was practised to unite it into one mass which should rise all together All that is below the line $a\ b$ is built of large blocks of Portland stone, dovetailed with sound oak Four places in each course are interrupted by equal blocks of Kentish rag, sunk half way in each course these act as joggles, breaking the courses, and preventing them from sliding laterally

The portion a Y of the arch is joggled like the upper part The interior part is filled up with large blocks of Kentish rag, forming a kind of coursed rubble-work, the courses tending to the centres of the arch The under corner of each arch-stone projects over the one below it, and by this form takes hold of the rubble behind it Above this rubble the inverted arch I e G of Portland stone is constructed, it shares the pressure of the two adjoining arches along with the arch-stones in Y a and G b Thus all tend together to compress and keep down the rubble work in the heart of this part of the pier This is a very useful precaution, for it often happens, that when the centres of the arch are struck, before the piers are built up to their intended height, the thrust of the arches squeezes the rubble work horizontally, after the mortar has set, but before it has dried and acquired its utmost hardness Its bond is broken by this motion, and it is squeezed up and never acquires its proper firmness

Above this counter-arch is another mass of coursed rubble, and all is covered by a horizontal course of large blocks of Portland stone, butting against the back of the arch-stone ZI and its corresponding one in the adjoining arch This course connects the feet of the two arches, preserves the rubble work from too great compression, and protects it from soaking water, which last circumstance is of great importance

Now supposing the adjoining arch fallen, and all tumbled off that is not withheld by its situation, there will still remain in the pier a mass of about 3500 tons The weight of the portion VY is about 2000 tons The directions of the thrusts KY and YI are such, that it would require a load of 4500 tons on VY to overturn the pier round F this exceeds the constant weight on VY by 2500 tons, a weight incomparably greater than any that can ever be laid upon it

Such, according to professor Robison, is the ingenious construction of Mr Mylne Some engineers have attempted to withstand the horizontal thrusts of the arch by means of counter-arches extended much farther over the main arch, as may be seen in M Perronet's work, but they are not well calculated for their intended purpose A counter arch springing from any point between Y and V has no tendency to hinder that point from rising by the sinking of the crown, and such a counter arch will not resist the precisely horizontal thrust so well as the straight course of Mr Mylne

We shall conclude this long article by two obvious deductions 1 That the strength of circular arches of the same span are inversely proportional to the diameters of the circles of which those arches are parts That is, as far as the strength depends upon the wedge-like figure of the blocks which compose the arches, and supposing the weight of each to be the same 2 The span and height being the same, if the arch consisted of the flat side of an ellipse, it would be weaker than the circular arch, if it consisted of the other side of an ellipse (namely that of which the crown of the arch would be at the end of the transverse axis) it would be stronger

On the important subject of this article, we would recommend the able treatises of Dr Hutton and M Bossut already referred to, the dissertation under the word Arch in the Supplement to the Encyclo Britan , the chapter on Arches and Domes in Gregory's Mechanics, and an anonymous article in No 79, Nicholson's Journal, N S

Arch (Centre of Gravity of) In estimating the effects of pressure upon a pier, it is necessary to know the situation of the centre of gravity of an arch Now it has been proved, that the centre of gravity of the materials upon a curve in equilibrio will be in a vertical line that passes through the point of intersection of the tangents to the extreme point of the curve

Let $a b c$ (fig 4 pl 14) be the curve loaded to the equilibrium, let ad be a tangent to the curve at a, cd a tangent to the curve at c, and le a tangent to the curve at b (the crown) The centre of gravity of the whole materials is in a vertical line which passes through d, and the centre of gravity of the materials over the arch a,b, is in a vertical line which passes through the point e, because the points d and e are respectively the points of intersection of the tangents, drawn from the extreme points of the portions in question of the curve

To find the horizontal distance af of the centre of gravity of the materials contained between the crown and the abutment, from the latter Drop a vertical line ef, from e, upon the ordinate y Let $af = d$, and x and y be parallel to, and cotemporary fluxions of, x and y respectively Then it is evident that

$\dot{x} : \dot{y} :: x\ (= ef) : d\ (= af)$,

$$\text{therefore generally } d = \frac{x\dot{y}}{\dot{x}}$$

If the curve be the arch of a circle, e,b is the tangent of half the arch, which subtracted from half the span, leaves d, = sine of the arch — tangent of half the arch

If the curve be the parabola $d = \frac{1}{2} y$ If it

be the equilibrial curve with a horizontal extrados, $d = \sqrt{\frac{}{2a+x}}$ Phil. Mag vol xi p 107

ARCH (Gothic, or Pointed), has undergone various modifications in its form At first it appears to have been composed of the two arcs which are described from the two lower angles of an equilateral triangle, to cross in a point at the vertex, and, as some suppose, originated in the intersection of two or more circular, or Saxon arches, as shewn in a figure in pl 15 Soon after, the pointed arch was made higher in proportion to its width And, in the 15th century, a new kind of low-pointed arch grew much into use It was described from four centres (pl 15), was very round at the haunches, and the angle at the top very obtuse This kind of arch is to be found in most of cardinal Wolsey's buildings But the Gothic arches of most complicated construction were used in the times of Richard II and Henry IV they were called contrasted Gothic arches, their construction is pointed out in the figure The plate also exhibits the north entrance to Peterborough cathedral, with the heads of Saxon columns, and the tower of York minster, a most elegant example of the modern Norman or florid style, taken from Essays on Gothic Architecture, published by Taylor

In the Transactions of the Irish Academy for 1789, there is an ingenious paper on the Origin and Theory of the Gothic Arch, by Dr M Young, which the curious reader may advantageously consult

Mural Arch See MURAL ARCH

Arches of the different Orders See ARCHITECTURE

Triumphal Arches are magnificent entries into cities, erected to adorn a triumph, and perpetuate the memory of the action The arches of Titus and Constantine make at this time a great figure among the ruins of ancient Rome

To ARCH *v a* (*arcus*, Latin) 1 To build arches (*Pope*) 2 To cover with arches (*Howel*) 3 To form into arches (*Bacon*)

ARCH *a* (from ἀρχὸς, *chief*) 1 Chief, of the first class (*Shakspeare*) 2 Waggish, mirthful (*Swift*)

ARCHÆOGRAPHIA, the art of describing antiquities

ARCHÆUS (ἀρχαῖος, from ἀρχὴ, *first*, or *chief*) In the writings of Van Helmont, the vital power or principle of life

ARCHA'NGEL *s* (*archangelus*, Latin) One of the highest order of angels (*Norris*)

ARCHANGEL See LAMIUM

ARCHANGEL (Baum-leaved) See MELITTUS

ARCHANGEL (Yellow) See GALEOPSIS

ARCHANGEL, or GOROD ARCH-ANGELSKOI, the capital of the province of Dwina in Russia This was formerly a place of great trade, but since the building of Petersburg it has greatly diminished, Lat. 64 34 N Lon 38 59 E

ARCHANGE'LICK *a* (from *archangel*) Belonging to archangels (*Milton*)

ARCHBE'ACON *s* (*arch* and *beacon*) The chief place of prospect, or of signal (*Carew*)

ARCHBI'SHOP *s* (*arch* and *bishop*) A bishop of the first class, who superintends the conduct of other bishops his suffragans (*Shakspeare*)

Archbishops were not known in the east till about the year 320; and though there were some soon after this who had the title, yet that was only a personal honour, by which the bishops of considerable cities were distinguished It was not till of late that archbishops became metropolitans, and had suffragans under them

Athanasius appears to be the first who used the title archbishop, which he gave occasionally to his predecessor, Gregory Nazianzen, in like manner, gave it to Athanasius, not that either of them were intitled to any jurisdiction, or even any precedence, in virtue of it

The archbishop of Canterbury had anciently, viz till the year 1152, jurisdiction over Ireland as well as England, and was styled a patriarch, and sometimes *alterius orbis papa*, and *orbis Britannici pontifex* Matters were done and recorded in his name thus, *anno pontificatus nostri primo*, &c The first archbishop of Canterbury was Austin, appointed by king Ethelbert, on his conversion to Christianity, about the year 598 He was also *legatus natus* He even enjoyed some special marks of royalty, as, to be patron of a bishoprick, which he was of Rochester, and to make knights, coin moneys, &c —He is still the first peer of England, and the next to the royal family, having precedence of all dukes, and all great officers of the crown It is his privilege, by custom, to crown the kings and queens of this kingdom He may retain and qualify eight chaplains, whereas a duke is by statute allowed only six

The archbishop of York has the like rights in his province, as the archbishop of Canterbury He has precedence of all dukes not of the royal blood, and of all officers of state, except the lord high chancellor He has also the rights of a count palatine over Hexamshire The first archbishop of York was Paulinus, appointed by pope Gregory about the year 622

Scotland, whilst episcopacy prevailed in that country, had two archbishops, of St Andrews and Glasgow, of which the former was accounted the metropolitan, and, even before it arrived at the dignity of an archbishoprick, resisted with great spirit all the attempts of the archbishops of York in England to become the metropolitans of Scotland —Ireland has four archbishops, viz Armagh, Dublin, Cashel, and Tuam, of whom the former is primate of all Ireland

ARCHBI'SHOPRICK *s* (from *archbishop*) The state, province, or jurisdiction of an archbishop (*Clarendon*).

The first establishment of archbishopricks in England, says Bede, was in the time of Lucius, said to be the first Christian king of England, who, after the conversion of his subjects, erected three archbishopricks, in London, York, and Landaff, then called Caerleon The dignity of archbishop continued in the see of London 180 years, when it was translated to Canterbury, where it has continued ever since York remains a metropolitical see to this day The archbishop of Canterbury is styled Primate and Metropolitan of all England, and the archbishop of York, Primate and Metropolitan of England

ARCHBUTLER, one of the great officers of the German empire, who presents the cup to the emperor on solemn occasions This office belongs to the king of Bohemia

ARCHCHAMBERLAIN, an officer of the empire, much the same with the great chamberlain in England

ARCHCHANCELLOR, a high officer who, in ancient times, presided over the secretaries of the court

ARCHCHANTOR, the president over the chantors of a church

ARCHCOUNT, a title formerly given to the earl of Flanders, on account of his great power and riches

ARCHDEACON, ARCHIDIACONUS A church-officer vested with a jurisdiction over the laity and clergy, next after the bishop, either through the whole diocese, or only a part of it

The archdeacon, sometimes also called archlevite, was originally the first and eldest of the deacons who attended on the bishop whence his name

An archdeacon was not known before the council of Nice his function is since become a dignity, and even set above that of priest though anciently it was quite otherwise The archdeacon was the bishop's chief minister for all external concerns, and particularly the administration of the temporalities He took care that order and decency were observed in divine service, looked to the ornaments and utensils of the church, had the direction of the poor, and the inspection of the manners and behaviour of the people for which reason he was called the bishop's heart, and eye, *oculus episcopi*, and *cor episcopi*

We have sixty archdeacons in England their office is to visit every two years in three, to enquire into the reparations and moveables belonging to the church, reform abuses in ecclesiastical matters, and bring the more weighty affairs before the bishop, besides which, they have also a power to suspend, excommunicate, and in many places to prove wills, and in some to institute to benefices

It is one part of the archdeacon's office to induct all clerks into their benefices within his jurisdiction, and, by the act of uniformity, he is now obliged to be in priest's orders

Many archdeacons, in old foundations, have, by prescription, their courts and officials, as bishops have

ARCHDRUID, the chief or pontiff of the ancient druids

ARCHDUKE, a title peculiar to the house of Austria, all the sons of which are archdukes, and daughters archduchesses See DUKE

ARCHE (αρχη, *the beginning*) In medicine, the first stage, or attack of a disease

ARCHED (*fornicatus*) In botany, as the upper petal of the aconite, and the upper lip of some ringent flowers (See VAULTED) It should seem that either term might be adopted indifferently

ARCHED A horse is said to have arched legs when his knees are incurvated or bent archwise This term relates only to the fore quarters, and the defect here alluded to is generally occasioned by excess of travel The horses called brassicourts likewise have their knees bent, but in a different manner, and proceeding from a natural deformity while the real arched leg is the constant result of mismanagement

ARCHELAUS, in biography, a Greek philosopher, was born either at Miletus or Athens He was a disciple of Anaxagoras at Lampsacus, occupied the chair of that philosopher after his death, and may be considered as the last preceptor of the original Ionic school Afterwards he removed to Athens, and with him the Ionic school was removed thither Here he acquired distinguished reputation by publicly teaching the doctrines of Anaxagoras concerning natural bodies, whence he was denominated the Natural Philosopher Among the scholars of Archelaus, who were numerous, Socrates was eminently distinguished, and under him philosophy assumed a new character

ARCHERS, a kind of militia, or soldiery, armed with bows and arrows The word is formed of *arcus*, a bow, whence *arcuarius*, and even *arquis* and *arquites*, as they are denominated in corrupt Latin

ARCHERY, the art or exercise of shooting with a bow With most of the ancient nations, the bow was the principal implement of war, and by the expertness of the archers alone was often decided the fate of battles and of empires Even in this island archery was greatly encouraged in former times, and many statutes were made for its regulation, whence it was that the English archers in particular became the best in Europe, and procured many signal victories The Artillery Company of London, though they have long disused the weapon, are the remains of the ancient fraternity of bowmen or archers Artillery (*artillerie*) is a French term signifying archery, as the king's bowyer is in that language styled *artillier du roi* and from that nation the English seem to have learnt at least the cross-bow archery We therefore find that William the Conqueror had a considerable number of bowmen in his army at the battle of Hastings, when no mention is made of such troops on the side of Harold, and it is supposed, that these Norman archers shot with the arbalest (or cross-bow,) in which

formerly the arrow was placed in a groove, being termed in French a *quadrel*, and in English a bolt. Of the time when shooting with the long-bow first began among the English, at which exercise they afterwards became so expert, there appear no certain accounts

In the use of the bow, great dexterity as well as strength seems to have been requisite Though we hear of arrows at Cheviot Chace which were a yard long, yet is it by no means to be supposed that the whole band made use of such or could draw them to the head The regulation of the Irish statute of Edward IV viz that the bow shall not exceed the height of a man, is allowed by archers to have been well considered, and as the arrow should be half the length of the bow, this would give an arrow of a yard in length to those only who were six feet high A strong man of this size in the present times cannot easily draw above twenty-seven inches, if the bow is of a proper strength to do execution at a considerable distance At the same time it must be admitted, that as our ancestors were obliged by some of the old statutes to begin shooting with the long-bow at the age of seven, they might have acquired a greater sleight in this exercise than their descendants, though the latter should be allowed to be of equal strength

An arrow, when shot from a long-bow at a proper elevation, has been often projected to the distance of 220 yards, and sometimes, under peculiar advantages of situation, to a greater distance The force with which an arrow has been often shot, was such as caused it to pierce through an inch board of well-seasoned timber And, as to time, an archer could shoot six arrows in the time of once charging and discharging a musket

Though archery continued to be encouraged by the kings and legislature for more than two centuries after the first knowledge of the effects of gunpowder, yet by the latter end of the reign of Henry VIII it seems to have been rather considered as a pastime Since that period the employment of it for warlike purposes has long ceased in Europe, and the bow and arrow, so formidable in the days of our ancestors, have been only seen in the hands of children As a manly exercise, however, the fashion of archery has of late years been revived in various societies in Britain, particularly the Toxopholites, Woodmen of Arden, the Royal Company of Archers in Scotland, &c which are countenanced by the first of our nobility, but their meetings are merely for the purpose of conviviality and recreation

ARCHES, or COURT OF ARCHES, the supreme court belonging to the archbishop of Canterbury, to which appeals lie from all the inferior courts within his province

ARCHITYPE, ARCHETYPUS, the first pattern, or model, by which any work is formed, or which is copied after, to make another like it

The word is compounded of ἀρχη, beginning, and τυπος, type —In this sense the word coincides with original, or prototype, and stands opposed to copy

Among minters, &c. archetype is peculiarly used for the standard or original weight, by which the other weights are to be adjusted and examined

ARCHILOCHUS, a famous Greek poet and musician, was, according to Herodotus, contemporary with Candaules and Gyges, kings of Lydia, who flourished about the 14th Olympiad, 724 years before Christ But he is placed much later by modern chronologists, viz by Blair 686, and by Priestley 660 years, B C

He was born at Paros, one of the Cyclades His father Telesicles was of so high a rank, that he was chosen by his countrymen to consult the oracle at Delphos concerning the sending a colony to Thasos a proof that he was of one of the most distinguished families upon the island However, he is said to have sullied his birth by an ignoble marriage with a slave called Enipo, of which alliance our poet-musician was the fruit

Though Archilochus shewed an early genius and attachment to poetry and music, these arts did not prevent his going into the army, like other young men of his birth, but in the first engagement at which he was present, the young poet, like Horace, and like our own Suckling, lost his buckler, though he saved his life by the help of his heels It is much easier, said he, to get a new buckler, than a new existence This pleasantry, however, did not save his reputation, nor could his poetry or prayers prevail upon Lycambes, the father of his mistress, to let him marry his daughter, though she had been long promised to him After these mortifications, his life seems to have been one continued tissue of disgrace and resentment

Archilochum proprio rabies armavit iambo
Hor Art Poet 79

Archilochus, with fierce resentment warm'd,
Was with his own severe iambics arm'd
Francis

The rage of Archilochus was proverbial in antiquity, which compared the provoking this satyrist to the treading upon a serpent, a comparison not very severe, if it be true that Lycambes, and, as some say, his three daughters were so mortified by his satire, as to be driven to the consolation of a halter

In this piece many adventures are mentioned, full of defamation, and out of the knowledge of the public There were likewise many loose passages in it, and it is said to have been on account of this satire that the Lacedæmonians laid a prohibition on his verses

However, according to Plutarch, there is no bard of antiquity by whom the two arts of poetry and music have been so much advanced, as by Archilochus To him is attributed particularly the sudden transition from one rhythm to another of a different kind, and the manner of accompanying those irregular measures upon the lyre Heroic poetry, in hexameter verse, seems to have been solely in use among

the more ancient poets and musicians; and the transition from one rhythm to another, which lyric poetry required, was unknown to them so that, if Archilochus was the first author of this mixture, he might with propriety be styled the Inventor of Lyric Poetry, which, after his time, became a species of versification wholly distinct from heroic —To him is likewise ascribed the invention of epodes

Archilochus was slain by one Callondax Corax, of the island of Naxos, who, though he did it in fight, according to the laws of war, was driven out of the temple of Delphi, by command of the oracle, for having deprived of life a man consecrated to the muses

ARCHILOCHIAN, a term in poetry, applied to a sort of verses, of which Archilochus was the inventor These consist of seven feet, the first four whereof are ordinarily dactyls, though sometimes spondees, the three last trochees for instance

Solvitur acris hyems grata vice veris et Favoni Hor

It is usual to mix iambic verses of six feet, abating a syllable, with Archilochian verses, thus Horace himself has done in the ode now cited

ARCHIMA'GIA (from ἀρχη, *the chief*, and *maga* Arab contemplation) Chemistry, as being the chief of sciences

ARCHIMAGUS the high priest of the Persian Magi, or worshippers of fire He resided in the highest fire temple, which was held in the same veneration with them, as the temple of Mecca among the Mahometans Zoroastres first settled it at Balch, but after the Mahometans had over-run Persia in the 7th century, the archimagus was forced to remove from thence into Kerman, a province of Persia, lying on the southern ocean, where it hath continued to this day Darius Hystaspes took upon himself the dignity of archimagus for Porphyry tells us, he ordered before his death, that among the other titles, it should be engraven on his monument, that he had been Master of the Magi, which plainly implies that he had borne this office among them, for none but the archimagus was master of the whole sect

ARCHIMANDRITE, the superior of a monastery, amounting to what we now call abbot

ARCHIMEDES, a great mathematician, was born at Syracuse, and was related to Hiero, king of that place flourishing about 240 years before Christ His method of discovering the fraud of a jeweller who had been employed to make a crown for Hiero, discovers the singular penetration of his mind That monarch, suspecting that the crown which he had ordered did not contain the quantity of gold which he had given to the workman, desired Archimedes to find out the fraud His thoughts being intent upon this problem while he was in the bath, he observed that a quantity of water overflowed equal to the bulk of his body This shewed him at once how the problem was to be solved, and he ran homewards, crying out εὕρηκα! εὕρηκα! I have found it, I have found it! Then procuring two masses of gold and silver of equal weight with the crown, he carefully noticed the quantity of water which each displaced, after which he observed how much the crown caused to flow over, and on comparing this quantity with each of the former, he was able to ascertain the proportions of gold and silver in the crown —Some ancient authors celebrate a glass machine made by Archimedes, which according to them represented exactly the motions of the heavenly bodies, and he is also said to have made burning glasses which destroyed ships at a great distance Archimedes became most famous by his curious contrivances by which the city of Syracuse was so long defended, when besieged by the Roman consul Marcellus, showering upon the enemy sometimes long darts and stones of vast weight and in great quantities, at other times lifting their ships up into the air, that had come near the walls, and dashing them to pieces by letting them fall down again, nor could they find their safety in removing out of the reach of his cranes and levers, for then he contrived to set fire to them with the rays of the sun reflected from burning glasses However, notwithstanding all his art, Syracuse was at length taken by storm, and Archimedes was so very intent upon some geometrical problem, that he neither heard the noise, nor regarded any thing else, till a soldier that found him tracing lines asked his name, and upon his request to be gone, and not disorder his figures, he slew him What gave Marcellus the greatest concern, says Plutarch, was the unhappy fate of Archimedes, who was at that time in his museum and his mind, as well as his eyes, so intent upon some geometrical figures, that he neither heard the noise of the Romans nor perceived the city to be taken In this depth of study and contemplation, a soldier came suddenly upon him, and commanded him to follow him to Marcellus, which he refusing to do till he had finished his problem, the soldier in a rage drew his sword, and ran him through Livy says he was slain by a soldier not knowing who he was, while he was drawing schemes in the dust, that Marcellus was grieved at his death, and took care of his funeral, and made his name a protection and honour to those who could claim a relationship to him His death it seems happened about the 142d or 143d Olympiad, or 210 years before the birth of Christ

The expression which Archimedes made use of to king Hiero is well known Give me a fixed point, said the philosopher, and I will move the earth from its place This affords matter for a curious calculation, viz to determine how much time he would have required to have moved the earth only one inch Ozanam, after making proper allowances, states the time at 3,653,745,176,803 centuries! See Hutton's Ozanam, part 5

A whole volume might be written upon the curious methods and inventions of Archimedes,

that appear in his mathematical writings now extant only. He was the first who squared a curvilineal space, unless Hippocrates must be excepted on account of his lunes. In his time the conic sections were admitted into geometry, and he applied himself closely to the measuring of them, as well as other figures. Accordingly he determined the relations of spheres, spheroids, and conoids, to cylinders and cones, and the relations of parabolis to rectilineal planes whose quadratures had long before been determined by Euclid. He has left us also his attempts upon the circle: he proved that a circle is equal to a right-angled triangle, whose base is equal to the circumference, and its altitude equal to the radius; and consequently, that its area is equal to the rectangle of half the diameter and half the circumference, thus reducing the quadrature of the circle to the determination of the ratio between the diameter and circumference, which determination however has never yet been effected, though we have very neat approximations by Archimedes and others.

Besides these figures, he determined the measures of the spiral, described by a point moving uniformly along a right line, the line at the same time revolving with a uniform angular motion, determining the proportion of its area to that of the circumscribed circle, as also the proportion of their sectors.

Many of the works of this great man are still extant, though the greatest part of them are lost. The pieces remaining are as follow: 1. Two books on the Sphere and Cylinder.—2. The Dimension of the Circle, or proportion between the diameter and the circumference.—3. Of Spiral Lines.—4. Of Conoids and Spheroids.—5. Of Equiponderants, or Centres of Gravity.—6. The Quadrature of the Parabola.—7. Of Bodies floating on Fluids.—8. Lemmata.—9. Of the Number of the Sand.

The most complete edition now extant of the works of Archimedes, is the magnificent one in folio, printed at Oxford in 1792. This edition was prepared ready for the press by the learned Joseph Torelli, of Verona, and in that state presented to the university of Oxford. The Latin translation is a new one. At the end of the whole a large appendix is added, in two parts, the first being a Commentary on Archimedes's paper upon Bodies that float on Fluids, by the rev. Abram Robertson of Christ-church college, and the latter is a large collection of various readings in the manuscript works of Archimedes, found in the library of the late king of France, and of another at Florence, as collated with the Basil edition.

ARCHIMIA. (from ἀρχη, *chief*, and χυμια, *chemistry*.) Alchemy, or the transmutation of metals.

ARCHIMIME, among the Romans, denoted the same in effect as an arch-buffoon, or mimic.

ARCHIPELAGO, in geography, a sea interspersed by a great number of islands. Thus the Archipelago denotes a considerable part of the Mediterranean Sea, having Romania on the north, Natolia on the east, Macedonia, Livadia, and the Morea, on the west, and the isle of Candia on the south. It is partly in Europe, and partly in Asia, containing the islands of Rhodes, Negropont, Lemnos, Samos, Patmos, &c. &c.

ARCHIPRESBYTER. See ARCHPRIEST.

ARCHISYNAGOGUS, in the Jewish history, the chief or ruler of the synagogue.

ARCHITECT. *s.* (*architectus*, Lat.) 1. A professor of the art of building (*Wotton*). 2. A builder (*Milton*). 3. The contriver of any thing (*Shakspeare*).

ARCHITECTIVE. *a.* (from *architect*.) That performs the works of architecture (*Derham*).

ARCHITECTONIC. *a.* (from ἀρχος, *chief*, and τεκτων, *an artificer*.) That has the power and skill of an architect (*Boyle*).

ARCHITECTURE, the art of building or erecting edifices, whether for habitation, for worship, for ornament, or for defence. It is subdivided into civil, military, and naval.

ARCHITECTURE (Civil), called absolutely and by way of eminence architecture, is the art of constructing edifices for the uses of civil life in every capacity, as bridges, churches, dwelling houses, colleges, halls, palaces, temples, &c.

ARCHITECTURE (Military), is the art of strengthening and fortifying places, to screen them from the insults of enemies, and the violence of arms. This we more usually call fortification.

ARCHITECTURE (Naval) or SHIP-BUILDING, is that which teaches the constructions of ships, galleys, and other floating vessels for the water, with ports, moles, docks, &c. on the shore.

That architecture is of great antiquity is undeniable. But the primitive buildings were very different from the specimens of architecture we now meet with in civilized countries. In those mild climates which seem to have been the first inhabited parts of this globe, mankind stood more in need of shade from the sun than of shelter from the inclemency of the weather. A very small addition to the shade of the woods, served them for a dwelling. Sticks laid across from tree to tree, and covered with brushwood and leaves, formed the first houses in those delightful regions. As population and the arts improved, these huts were gradually refined into commodious dwellings. The materials were the same, but more artfully put together. At last agriculture led the inhabitants out of the woods into the open country. The connection between the inhabitant and the soil became more constant and more interesting. The wish to preserve this connection was natural, and fixed establishments followed of course. Durable buildings were more desirable than those temporary and perishable cottages, stone was substituted for timber. But as these improved habitations were gradual refinements on the primitive hut, traces of its construction remained, even when

the choice of more durable materials made it in some measure inconvenient Thus it happens that the trunks of trees, upright, represent columns, the girts or bands, which served to keep the trunks from bursting, expressed bases and capitals, and the summers, laid across, gave a hint of entablatures, as the coverings, ending in points, did of pediments — See pl 16

We shall not enter minutely into a history of the progress of architecture, but shall shew that the above view of ornamental architecture will go far in accounting for some of the more general differences of national style which may be observed in different parts of the world The Greeks borrowed many of their arts from their Asiatic neighbours, who had cultivated them long before It is highly probable that architecture travelled from Persia into Greece In the ruins of Shushan, Persepolis, or Tchilminar, are to be seen the first models of every thing that distinguishes the Grecian architecture There is no doubt, we suppose, among the learned, as to the great priority of these monuments to any thing that remains in Greece, especially if we take into account the tombs on the mountains, which have every appearance of greater antiquity than the remains of Persepolis In those tombs we see the whole ordonnance of column and entablature, just as they began to deviate from their first and necessary forms in the wooden buildings We have the architrave, frize, and corniche, the far projecting mutules of the Tuscan and Doric orders, the modillions no less distinct, the rudiments of the Ionic capital, the Corinthian capital in perfection, pointing out the very origin of this ornament, viz a number of long graceful leaves tied round the head of the column with a fillet, a custom which we know was common in their temples and banqueting rooms Where the distance between the columns is great, so that each had to support a weight too great for one tree, we see the columns clustered or fluted, &c In short, we see every thing of the Grecian architecture but the sloped roof or pediment, a thing not wanted in a country where it hardly ever rains In the stone-buildings of the Greeks, the roofs were imitations of the wooden ones, hence the lintels, flying corniches, ceilings in compartments, &c

The ancient Egyptian architecture seems to be a refinement on the hut built of clay, or unburnt bricks mixed with straw every thing is massive, clumsy, and timid, small intercolumniations; and hardly any projections

The Arabian architecture seems a refinement on the tent A mosque is like a little camp, consisting of a number of little bell tents, stuck close together round a great one A caravansary is a court surrounded by a row of such tents, each having its own dome The Greek church of St Sophia at Constantinople has imitated this in some degree, and the copies from it, which have been multiplied in Russia as the sacred form for a Christian church, have adhered to the original model of clustered tents in the strictest manner We are sometimes disposed to think that the painted glass (a fashion brought from the east) was an imitation of the painted hangings of the Arabs

The Chinese architecture is an evident imitation of a wooden building Sir George Staunton says, that the singular form of their roofs is a professed imitation of the cover of a square tent

The great incorporation of architects who built most of the cathedrals of Europe departed entirely from the styles of ancient Greece and Rome, and introduced another in which arcades made the principal part Not finding in every place quarries from which blocks could be raised, in abundance, of sufficient size for forming the far-projecting corniches of the Greek orders, they relinquished those proportions, and adopted a style of ornament which required no such projections and having substituted arches for the horizontal architrave or lintel, they were able to erect buildings of vast extent with spacious openings, and all this with very small pieces of stone The form which had been adopted for a Christian temple occasioned many intersections of vaultings, and multiplied the arches exceedingly Constant practice afforded opportunities of giving all possible varieties of these intersections, and taught the art of balancing arch against arch in every variety of situation In a little time arches became their principal ornament, and a wall or ceiling was not thought properly decorated till it was filled full of mock arches, crossing and butting on each other in every direction In this process in their ceilings these architects found that the projecting mouldings, which we now call the Gothic tracery, formed the chief support of the roofs The plane surfaces included between those ribs were commonly vaulted with very small stones, seldom exceeding six or eight inches in thickness This tracery, therefore, was not a random ornament Every rib had a position and direction that was not only proper, but even necessary Habituated to this scientific arrangement of the mouldings, they did not deviate from it when they ornamented a smooth surface with mock arches, and in none of the highly ornamented ancient buildings shall we find any false positions This is far from being the case in most of the modern imitations of this species of architecture

We call the middle ages rude and barbarous, and give to their architecture the appellation Gothic, but there was surely much knowledge in those who could execute such magnificent and difficult works The more appropriate terms, we conceive, would be those of Saxon and Norman architecture, at least, so far as relates to such works in Britain, giving the first term to that kind distinguished by the circular arch, and the latter to that distinguished by the pointed arch for under the guidance of these respective nations did each kind principally display its grandeur and peculiarities

The architects of whom we now speak do not appear to have studied the theory of equili-

grated arches: but, for a long period, they adopted an arch which was very strong, and permitted considerable irregularities of pressure, we mean, the pointed arch. The very deep mouldings with which it was ornamented, made the arch-stones very long in proportion to the span of the arch. They had, however, with great care, studied the mutual thrust of arches on each other, and they contrived to make every invention for this purpose become an ornament, so that the eye required it as a necessary part of the building Thus we frequently see small buildings having buttresses on the sides These are necessary in a large vaulted building, for withstanding the outward thrust of the vaulting, but they are useless when there is a flat ceiling within Pinnacles on the heads of buttresses are now considered as ornaments, but originally they were put there to increase the weight of the buttress even the great tower in the centre of a cathedral, which now constitutes its chief ornament, is a load almost indispensably necessary, for enabling the four principal columns to withstand the combined thrusts of the aisles, of the naves, and transepts In short, the more closely we examine the ornaments of this architecture, the more shall we perceive that they are essential parts, or derived from them by imitation and the more we consider the whole style of it, the more clearly do we see that it is all deduced from the relish for arcades, indulged in the extremes, and pushed to the limit of possibility of execution

From the end of the 15th century, this architecture began to decline, and was soon after supplanted by a mixed style, if we may venture to call it so, wherein the Grecian and Gothic, however discordant and irreconcilable, are jumbled together Concerning this mode of building, Mr Warton, in his observations on Spenser's Fairy Queen, has the following anecdotes and remarks

"Although the Roman or Grecian architecture did not begin to prevail in England till the time of Inigo Jones, yet our communication with the Italians, and our imitation of their manners, produced some specimens of that style much earlier Perhaps the earliest was Somerset-house in the Strand, built about the year 1549, by the duke of Somerset, uncle to Edward VI

"In the year 1613, the magnificent portico of the schools at Oxford was erected, in which, along with the old Gothic style, the architect has affectedly displayed his extraordinary skill in the Grecian and Roman architecture, and has introduced all the five orders together

"In the 15th and 16th centuries, when learning of all kinds began to revive, the chaste architecture of the Greeks and Romans seemed, as it were, to be recalled into life. The first improvements of it began in Italy, and even owed their existence to the many ruins of the ancient Roman structures that were to be found in that country, from whence an improved method of building was gradually brought into the other countries of Europe and though the Italians for a long time retained the superiority as architects, over the other European nations, yet as men of genius from all quarters constantly visited Italy for the purpose of improvement in architecture, as well as the other arts, since that period they have been equalled, if not surpassed, by architects of other nations, and even of our own country"

The orders, as now executed by architects, are five, viz the Tuscan, the Doric, the Ionic, the Corinthian, and the Composite, which are distinguished from each other by the column with its base and capital, and by the entablature The Tuscan order is characterised by its plain and robust appearance, and is therefore used only in works where strength and plainness are wanted, it has been used with great effect and elegance in that durable monument of ancient grandeur, the Trajan column at Rome indeed, general consent has established its proportions for such purposes beyond all others The Doric possesses nearly the same character for strength as the Tuscan, but enlivened by its peculiar ornaments, the triglyph mutule, and guttæ or drops under the triglyph, these decorations characterize the Doric order, and in part are inseparable from it Its proportions recommend it where united strength and grandeur are wanted The Ionic partakes of more delicacy than either of the former, and therefore as well as on account of its origin, is called Feminine and not improperly supposed to have a matronic appearance It is a medium between the masculine Tuscan and Doric, and the virginal slenderness of the Corinthian the boldness of the capital, with the beauty of the shaft, makes it eligible for porticoes, frontispieces, entrances to houses, &c Dentels were first added to the cornice of this order The Corinthian possesses more delicacy and ornament than any other order, the beauty and richness of the capital, and the delicacy of the pillar, render it the most suitable in those edifices where magnificence and elegance are required On this account it is frequently used for the internal decoration of large state rooms, in which it has a chaste appearance, though at the same time superb The Composite order is the same as the Corinthian in its proportions, and nearly alike in ornamental properties The addition of the modern Ionic volute to the capital, gives a bolder projection It is applicable in the same manner and in the same cases as the Corinthian See the plates of the different orders also the observations upon each order in the following system

The first complete system of architecture we meet with is that of Vitruvius, who lived in the reigns of Julius Cæsar and Augustus Since Vitruvius, the principal authors are Alberti, Baldus, Barbarus, Blondel, Cataneo, Demontiosius, Freard, Goldman, Gulielmus, Langley, Mayer, Nicholson, Pain, Palladio, Perrault, Rivius, Serlio, Scamozzi, Vignola, and Ware. On the subject of Gothic architecture, we refer to Essays on Gothic Architecture, published by Taylor, and to a paper

in vol iv Trans Royal Society Edin by sir James Hall

GENERAL PRINCIPLES OF ARCHITECTURE

Sect I *Of Composition and Harmony in Building*

Architecture being a useful and fine art, leads us to apply the practice of it in three different ways, first for utility, secondly, for ornament, and thirdly, for the construction of such buildings, or parts of buildings, as require both effect in ornaments and usefulness of parts

Buildings, intended solely for utility, ought in every part to correspond with that design Any material deviation from usefulness for the sake of ornament ought to be strictly avoided Works of entire usefulness are considered as a mean to some end, and the nearer they approach to a perfect mean for obtaining that end, the more will such structures gain our applause though every beauty of ornament be neglected On the other hand, in such works as are merely calculated for ornament, beauty alone ought to be regarded In this case, the art of which we are treating is capable of exciting a variety of agreeable feelings, as veneration, admiration, grandeur and astonishment The principal difficulty, however, is to combine the qualities of usefulness and agreeable effect in ornamental structures The most practicable method is to prefer utility to ornament in proportion as the character of the building will admit of it In palaces, and such buildings as are capable of a variety of useful contrivance, regularity ought to be preferred, but in dwelling-houses that are on too small a scale for variety of contrivance, regularity should give place to usefulness, so far at least as the former stands in direct opposition to the latter

In considering attentively the beauty of visible objects, we discover two kinds The first may be termed intrinsic beauty, because it is discovered in a single object, without relation to another The second may be termed relative beauty, being founded on a combination of relative objects Architecture admits of both kinds

There is a sort of beauty or harmony in the whole character of a building with relation to its intended occupier Vitruvius, Palladio, and other ancient writers, have been careful to inculcate this doctrine, as absolutely necessary to be observed by a good architect Indeed it is founded on self-evident principles, for all will admit, that the appearance of a palace ought to convey an idea of the majesty and grandeur which are peculiar to monarchs, so that a common observer may pronounce, on the first view of such an edifice, that it is destined to be the habitation of so dignified a personage Nature herself is a precedent for this doctrine The vaulted canopy of the heavens, and all their richly ornamented spheres, constitute a glorious temple that most accurately bespeaks the character of its divine possessor The like conformity should appear in temples made with hands, and in those inferior structures erected by art for the accommodation of the various classes of human society Palladio has a remark to the following effect If the architect is employed to build a house for any public officer of the nation, such as an ambassador, or prime minister, &c he should introduce porticos, galleries, and magnificent halls, richly adorned, in order that such as attend on business, or visit the possessor, may be agreeably interested and amused while they wait In all cases, regard is to be paid to the dignity, rank, or profession of the occupier, rather than to his wealth But if a building is destined to some particular and public profession, then we should regard the public use for which it is intended, without confining our ideas to the quality of any individual proprietor A playhouse must have a gay and splendid style a heathen temple, though these are now far removed from us, is considered as a house dedicated to some divinity, and therefore in conformity to its destination, it must be elevated, magnificent, and grand, and as the dark mysteries of the heathen theology required something gloomy to give them an air of reality and sanctity, these temples were contrived to produce a somewhat dark and gloomy appearance But we by no means ought to infer from this, that our churches should be so managed, for we do not believe, with a certain architect, that dimness, obscurity, and gloom, produce that tone of mind which is favourable to humility and devotion The style of a church ought to be grave, bold, and magnificent, affording a proper quantity and equal distribution of light to every part used in the time of worship The appearance and style of a monument ought to be solemn and gloomy, so ornamented as to awaken the memory of the deceased in the minds of surviving friends Courts of justice, senate houses, or the like, have also their proper style, which will always be observed by good architects

Sect II *Of the Beauty of Proportion*

The proportions of a door are determined by the use to which it is destined The door of a dwelling house, which ought to correspond to the human size, is confined to seven or eight feet in height, and three or four in breadth Those proportions assigned to a stable or coach-house, are different The door of a church ought to be wide, to afford an easy passage to a multitude and its height should therefore be in proportion, that its appearance may please the eye The size of windows ought always to be in proportion to the dimensions of the room they are intended to illuminate, for if the apertures, or openings, be not large enough to convey light in an equal distribution to every part of the room, the whole will have a deformed appearance Steps of stairs should likewise receive a suitable proportion, and be accommodated to the human figure, without relation to the magnitude of any other part of

the building, and therefore in small and in larger houses they are alike in size, because men are nearly alike in stature The proportions of rooms are either intrinsic or relative, though in most cases both are included The intrinsic proportion of a room is its length, breadth, and height, which being properly adjusted, we pronounce it of a beautiful proportion, without regard to any other part of the building But the relative beauty of proportion is as the whole area of the room is to the magnitude of the house of which it composes a part A room may be well proportioned as to itself, but may, at the same time, be either too large or too small for the whole edifice In a sumptuous building, the capital rooms ought to be large, otherwise they will not be proportioned to the size of the whole, and for the same reason a very large room is improper in a small house, yet every house ought to have both large and small rooms, in proportion to itself Yet in things thus related, the mind requires not a precise or single proportion, rejecting all others, on the contrary, different proportions are sometimes equally agreeable to contemplate It is only when a proportion becomes loose and distant, that the agreeableness abates and at last vanishes With regard to the proportion the height of a room should bear to the length and breadth, it must be rather uncertain in some cases, arising from that deception to which the eye is subject when its height exceeds 16 or 17 feet, yet if a proper optical allowance be made, we do not think the attainment of a beautiful proportion so hazardous or arbitrary a task as some architects would insinuate A room 48 feet in length, and 24 in breadth and height, is well proportioned, but it is well known, that were we to reduce those to 12 and 24, a room would approach too near the appearance of a gallery Yet it is evident that, if the proportion be so adjusted as to be in the medium between these two, a room cannot produce a bad effect as to its size For instance, if the height and breadth be 18 feet each, and the length 36 feet, this proportion of a room is by architects termed harmonic, or agreeable to the eye, answering to diapente, one of the chords in music, which includes the interval from 1 to 5, and is agreeable to the ear

It is, however, evident, that the doctrine of harmonic proportions of rooms is not quite perfect, otherwise there could be no exceptions taken in any case Not so in the proportion of sounds, every chord is alike pleasing upon any scale, and though some of the chords are less perfect than others, yet all of them produce harmony to every ear capable of the sweet sensation of music We therefore are disposed to conclude that though there exists a considerable agreement between the doctrine of sounds and the dimensions of a room, yet they are not perfectly parallel, consequently the judicious architect will make his own exceptions With respect to the figure of rooms little need be said, as it is self-evident that those of four sides with right angles are best adapted for the reception of light and the distribution of furniture. Those, however, of the circular or regular polygonal kind are preferable, when the light comes in by an aperture in the roof or ceiling

Sect III *Of the external Proportions of Houses*

In the country where gentlemen's houses are detached, and are easily viewed in front and depth by an approaching traveller, a strict regard to proportion becomes necessary, for if the cube form be adopted in very large house, it will appear uncouth and heavy, whilst, on the other hand, it is equally disagreeable to see a dwelling house approach to the appearance of a lofty tower Very high dwelling houses prove exceedingly inconvenient, and therefore where beauty of proportion is connected with utility, they ought rather to assume the figure of a parallelopipedon resting on its larger base Hence that form of building which rather spreads upon the ground than rises in height, is always preferred In towns the houses being generally attached to each other, they unitedly compose a regular street or square, in which case, the proportions of an individual front are less obvious, and their depth in this respect immaterial The great object of concern is the uniformity of the whole when completed, or of one individual house with the whole In these situations, the proportions of houses, and the length and extent of streets, are rather subject to acts of parliament than to architectural laws

There are four different rates into which the proportion of houses in town are divided or classed by the legislature The first rate, or houses of the largest size, are such as exceed nine squares of building, those of the second rate are from five to nine squares, those of the third from three and a half to five squares, and of the fourth, not exceeding three squares and a half Their height is regulated in like manner, and the thickness of their walls and chimneys Under such restrictions the architect must often proceed under great disadvantages, and must occasionally call forth the good quality of docility recommended by Vitruvius

Sect IV *Of the Situation and internal Division of Houses*

This is certainly a subject highly worthy of the notice and choice of an architect It must be obvious that a rising ground is much better suited for a magnificent palace than a concealed valley, and that it would be incongruous and absurd to erect a sumptuous building on a wild, uncultivated, and barren ground, destitute of water, woods, hills, or other natural beauties, which nature has assigned to various and even extensive portions of the earth

Where such situations are left to the choice of the architect, it becomes him to apply his taste in fixing the precise situation or bearings of his intended work, in the execution of which he must attend to the four cardinal

points In the first place he must observe, that every internal division or room may receive a due degree of light and heat, suited to its intended use, and the different seasons in which it is more particularly to be occupied Here the skilful architect must exercise several of those qualifications enumerated by the famous Vitruvius, as essentially requisite to the formation of his character And indeed whatever qualifications are absolutely necessary in the proper choice of the situation and plan of a town or city, the same will be wanted to complete a country residence The first and grand objects of human concern in this life are health, pleasure, and convenience, and whatever contribute to these must be studied with great care

Hence the necessity of a situation best adapted for good air, a sufficient supply of wholesome water at a convenient distance for family use, fertile grounds, whose produce in summer may impregnate and render salubrious the element in which we breathe Directly opposed to these considerations are marshy, low, and barren lands, where even the hardy brute animal will scarcely thrive Stagnant waters must more especially be avoided

Palladio says, the infallible marks of a good situation for health are where the cattle thrive, and the inhabitants look ruddy and chearful In fixing on the precise spot of ground, that which is moderately elevated, if it be contiguous to some river, will be best adapted for health, pleasure, and most probably for convenience too In such a situation, the air acquires a constant motion and free circulation, by which it purifies itself as water does by a current, and becomes more salutary to the human frame And nothing can so much contribute to the excellence of a prospect as a river, especially a winding one, the beauty of which will, in idea, be heightened by its utility as the means of supplying water for family use These most essential preliminaries being settled, the architect proceeds to consider in what direction his front and flank are to be placed with respect to the south or north points This, in many instances, will be closely connected with the internal division of the house, which assigns to each room its particular use and season Cool drawing-rooms are suitable for summer, and for this purpose they should be large, and situated towards the north, or so as to be screened from the scorching beams of the sun Warm drawing rooms are adapted for winter, and therefore these should be small, and have a place towards the south, or where the reviving rays of the sun can have free intercourse Rooms appropriated for spring and autumn may be in a medium situation to these, and should have their windows to look into the different gardens or green walks Libraries, studies, breakfast and other morning rooms, should have the same sort of prospect, as being most conformable to morning exercises Finally, if the house be built on so large and magnificent a scale as to admit the same variety in all the different apartments, then the dining-parlours, bed rooms, &c will be subject to the same laws of situation, and answerable to the different seasons of the year

The several offices, which have a place in the plan of houses now described, should be so arranged as to appear to compose an inferior part of the whole building, not totally detached, yet in such order as to keep the more offensive ones as remote as possible from the principal parts of the house This indeed is the true doctrine of nature, for if we compare the several parts of a building to the various members which compose an animal frame, we see that the most beautiful parts are most conspicuous, whilst those that are less comely either recede from the view, or are quite concealed

Sect V *Of the various Ornaments which contribute to give a peculiar Expression or an apparent Usefulness to Buildings*

It has been doubted whether a building can admit of any ornament but such as are useful, or at least have the appearance of being so But considering architecture no less as a fine than a useful art, both kinds may be properly introduced A private house, and other edifices, where use is the chief aim, admit not indeed of any ornaments but such as have the appearance of utility But temples, triumphal arches, and such buildings as are chiefly intended for show, may be highly ornamented without any regard to their seeming usefulness Hence it is that a threefold division of ornaments has been suggested These are, 1st Ornaments that are beautiful without relation to use, such as statues, vases, &c 2d Objects in themselves not beautiful, but possessing the beauty of utility, by imposing on the spectator, and appearing to be useful, such as blind windows 3d Where things are beautiful in themselves, and at the same time assume the appearance of use, such as pilasters With regard to the first, we naturally require that a statue shall be so placed as that it may be seen in every direction, and at various distances, by having an opportunity of receding or advancing as we please Statues placed in the niches of fronts of houses, or on the tops of their walls and roofs, ought not to be admitted Their proper places are in large halls, and in passages that lead to a grand staircase, &c To adorn the top of the wall with a row of vases, is an unhappy conceit, by placing a thing, whose natural destination is utility, where it cannot have even the least appearance of it Now, firmness and solidity being the proper expressions of a pedestal, and, on the contrary, lightness and delicacy of carved work, the pedestal, whether of a column or of a statue, ought to be sparingly ornamented The ancients never ventured on any bolder ornament than the basso-relievo

With respect to ornaments of the second kind, it is a great blunder to contrive them so as to make them appear useless A blind window, therefore, when necessary for regularity, ought to be so disguised as to appear a

real window, when it appears without disguise, it is disgustful, as a vain attempt to supply the want of invention, it shows the irregularity in a stronger light, by signifying that a window ought to be there in point of regularity, but that the architect had not skill sufficient to connect external regularity with internal convenience

As to the third, it is an error to sink pilasters so far into the wall, as to remove totally, or mostly, the appearance of use They should always project so much from the wall, as to have the appearance of supporting the entablature over them

From ornaments in general, we descend to a pillar, the chief ornament in great buildings The destination of a pillar is to support, really, or in appearance, another part termed the entablature With regard to the form of a pillar, it must be observed, that a circle is a more agreeable figure than a square, a globe than a cube, and a cylinder than a parallelopipedon This last, in the language of architecture, is saying, that a column is a more agreeable figure than a pilaster, and for that reason it ought to be preferred, when all other circumstances are equal Another reason concurs, that a column annexed to a wall, which is a plain surface, makes a greater variety than a pilaster Besides, pilasters at a distance are apt to be mistaken for pillars, and the spectator is disappointed when, on a nearer approach, he discovers them to be only pilasters

With respect to buildings of every kind, one rule, dictated by utility, is, that they be firm and stable Another, dictated by beauty, is, that they also appear so to the eye for every thing that appears tottering, and in hazard of tumbling down, produces in the spectator the painful emotion of fear, instead of the pleasing emotion of beauty, and accordingly it should be the great care of the artist, that every part of his edifice appear to be well supported Some have introduced a kind of conceit in architecture, by giving parts of buildings the appearance of falling, of this kind is the church of St Sophia in Constantinople

The most considerable ornaments used in architecture are the five orders of columns, pediments, arches, balusters, &c of which we shall now speak

OF THE FIVE ORDERS OF ARCHITECTURE

Sect. I *Of the several Parts and Members of an entire Order*

The principal parts of an entire order are three; the pedestal, shaft, and entablature These principal parts are again subdivided as follows the pedestal contains the plinth *a* (see Tuscan order, pl 3) the dado *b*, and the cornice *c* The column includes a base *d*, a shaft *e*, and a capital *f* The entablature consists of an architrave *g*, a frieze *h*, and a cornice *i*.

Thus, in every entire order, there are three principal parts; and each of these is again subdivided into three smaller parts, which, in all, make nine The origin of these names is explained in the following manner.

The plinth takes its appellation from πλινθος, a brick or flat square stone on which columns in the most early state of architecture are supposed to have stood

The dado, or dye, is so called because it is of a cubic form

The cornice is derived from *coronis*, a top or summit, because the cornice is the extreme end or finishing of the pedestal

The base of the column is from βασις, a foundation or footing for the column

The shaft, that long and straight part of a column comprehended between the base and capital, is so named from σκαπτω, to dig, in the manner of a well, round and deep, whose inside resembles the shape of a pillar

The capital, from κεφαλη, or *caput*, the head, which the capital is to a column

The architrave, from αρχος, chief or principal, and *trabs*, a beam, because the architrave is the chief support to the whole entablature

The frieze is so called from φιξρον, a border or fringe, or which some of the ancients used to call ζωφορος, because their friezes were usually enriched with the figures of animals

The cornice of the entablature, or the crowning part of the entire order, needs no other explanation than that already given

These nine principal parts of a complete order, the dado and shaft excepted, are composed of small members, which constitute all that simple and pleasing variety of mouldings which adorned the works of the ancients The names of these mouldings allude to their forms, and their forms are adapted to the purposes for which they were intended The names of these members, with their origin and use, are as follows (see references to the Doric order, pl 3)

Fig 1 The fillet, from the French word *fil*, thread

2 The cymatium, or *cyma recta*, from κυματιον, a wave, because this member resembles the swelling and concavity of a wave

3 The cyma reversa, the preceding member inverted

4 The corona, or crown, because it is the principal member of the cornice, and serves as a shelter to the smaller mouldings of the entablature

5 The ovolo, from *ovum*, an egg, because this member by the ancients was frequently carved in the form of eggs

6. The cavetto, from *cavus*, hollow

7 Capital, or upper fillet of the triglyph

8 Triglyph, from τριγλυφο, three engravings, compounded of τρι, three, and γλυφω, to carve, or engrave, in conformity to which, the triglyph has two entire channels and two half ones, with three spaces between

Fig 9 The metope, from μέτωπη, the space between one aperture or hole to another, the triglyphs being supposed to be joists that fill the apertures hence the space between the triglyphs, which forms an exact square, is termed the metope

10 The frieze we have already explained

11 The band, the same as fillet

12 The drops, *guttæ*, are of a conical figure

13 Architrave See the foregoing explanation

14 The facia, or face, of which there are two in the architrave

15 The abacus, from αβαξ, a shelf or table, or, as some suppose, a tile, on which the ancient mathematicians strewed dust, to draw their geometrical schemes on The word seems to have been introduced into architecture on the invention of the Corinthian capital, which some say took its rise from an acanthus growing round a basket

16 The ovolo of the capital, which in this situation must be considered, the basket round which the acanthus grew

17 Annulets, because these small fillets encompass the capital, like rings joined to each other The moderns, in place of these, generally have a small cavetto

18 Colorino, collar, or neck of the capital

19 The astragal, from αςραγαλος, a bone of the heel, or, the curvature of the heel, which this member resembles The hollow which follows is termed αποφυγη, escape, because this part of the column appears to fly off

20 & 22 Upper and lower torus, from τορος, a cable, which this moulding somewhat resembles

21 The scotia, from σκοτια, darkness, because of the strong shadow which its concavity produces, and which is increased by the projecting torus above

The other references have already been explained, therefore we shall now proceed to take notice of the members or parts of other Doric entablatures which are not found in this In some of the Doric entablatures are mutules, from *mutuli*, modillions, which are placed perpendicularly over each triglyph, and are of the same width, and whose projection in the corona is the same, forming a perfect square In others are dentils, as in the theatre of Marcellus at Rome These are so named from *dentelli*, teeth, which they resemble, and the flat member on which these dentils are placed is termed denticulus The capitals of the Ionic, Corinthian, and Composite (see pl 4) have each of them volutes, so called from *volvendo*, to roll round, as on a staff Some call the volutes the horns of the capital, because they resemble the twisting of rams' horns

After this enumeration of all the members or distinct parts of the different orders, it may be proper to observe, that those parts which are termed mouldings are only eight in number viz the fillet or cincture to bind the parts The astragal also and torus, resembling ropes or cables, are strong binders and fortifiers of the parts with which they are connected. The ovolo is strong at its extremities, and is therefore fit to support projecting parts The cyma recta, inversa, and cavetto, are covering mouldings, which serve to shelter the other smaller members There are various methods of describing the contours of these, but the simplest, and perhaps the best, is to form them of quadrants of circles

Sect II *Of the Diminution of Columns*

In effecting the diminution of the shaft of a column, the ancients adopted a variety of methods, beginning sometimes from the foot of the shaft, and at others from one quarter, or one third of its height, the lower part being perfectly cylindrical The former of these was most in use amongst the ancients, and, being the most natural and graceful, ought to have the preference, though the latter has been more universally practised by modern artists

M Blondel, in his book entitled Resolution des quatre principaux Problemes d Architecture, teaches various manners of diminishing columns, the best and simplest of which is by means of the instrument which Nicomedes invented to describe the first conchoid for this, being applied at the bottom of the shaft, performs at one sweep both the swelling and the diminution, giving such a graceful form to the column, that it is universally allowed to be the most perfect practice hitherto discovered. The columns in the Pantheon, accounted the most beautiful among the antiques, are made in this manner, as appears by the exact measures of one of them to be found in Desgodetz's Antiquities of Rome

To have an accurate idea of the operation, it will be necessary first to describe Vignola's method of diminution, on which it is grounded Having determined the height of the shaft, draw a line indefinitely from D (pl 14) through C, perpendicular to the axis OP of the column, take then ID, half the inferior or largest diameter of the column, and place one foot of the compasses exactly on the extremity of the superior or smallest diameter, as at R, and depress the other, till it come into the axis or centre line of the shaft, as at S under O, through these two points draw a line indefinitely and produced till it cut the line DC, as at A, from A, the centre, draw any number of lines through the axis OP, as S, r, S, r, &c and on each of these place half the larger diameter of the shaft set off from the axis or perpendicular line OP, through which points,

thus found, if a curve line be drawn, it will describe the swelling and proper diminution of the column

Though this method be sufficiently accurate for practice, especially if a considerable number of points be found, yet, strictly speaking, it is defective, as the curve must either be drawn by hand, or by applying a flexible ruler to all the points, both of which are liable to variations Blondel, therefore, to obviate this objection, after having proved the curve passing from O to R through the points r, r, to be of the same nature with the first choncoid, employed the instrument of Nicomedes to describe it the construction of which is as follows This instrument is made of wooden laths in the triangular form described by PO, PC, and ABR (pl 14), the base and perpendicular of which are joined together at P, and has a stay the upright OP has a groove cut in it (see fig 5) To the lath ABR at S is fixed a button (see the fig), which passes along the groove from P to O, in the moving lath ABR is a common groove, cut through from A to B, and at A, in the lath DC, is fixed a button at the centre A, as described in the first method The length of the groove AB must exceed the difference of the length AS to AP, consequently, as the button S works in the groove OP, the groove AB permits it to move forward to P, by which the former swelling and diminution will be most correctly performed when a pencil is fixed at R, at a distance from the button S, equal to half of the largest diameter of the column It must be owned, however, that if the centre were moved considerably towards P, that this method would not describe a perfect curve or an agreeable diminution, for in this case, the curve at the top of the shaft will proportionally approach to a straight line, and at last almost become an inverted curve This, however, is no reasonable objection to the use of the instrument when applied to the diminution of columns, for the greatest quantity of diminution that can in any case be allowed, will not have the least perceptible effect on the curve, and therefore we may venture to affirm, that no other method yet discovered, nor any other instrument that can be invented by man, is likely to exceed it It is farther to be observed, that Nicomedes's instrument may be made to answer shafts of any dimensions, by making the respective grooves capable of extension by the use of sliders and moveable centres, which any architect is capable of contriving In the remains of antiquity, the quantity of diminution is various, but seldom less than one-eighth of the inferior diameter of the column, nor more than one-sixth. The last of these is esteemed the most perfect by Vitruvius, and is generally adopted by modern architects

Sect III. *Of the Origin, Character, Use, and Proportions of the Tuscan Order*

This order had its name and origin in Tuscany, one of the most considerable of the Italian states, which was first inhabited by the ancient Lydians from Asia This people first built temples of this order, and dedicated them to their idols in their new settlements It is the most solid and simple of all the orders It is composed of few parts, devoid of ornaments, and so massy, that it seems capable of supporting the heaviest burden There are no remains of a regular Tuscan order among the antiques the doctrine of Vitruvius concerning it is obscure, and the profiles of Palladio, Scamozzi, Serlio, de l' Orme, and Vignola, are all imperfect

This order, on account of its strong and massive proportions, has obtained the name of the rustic order, in conformity to which character, it is generally employed in farm houses, stables, and such-like edifices It is, however, sometimes used in superior buildings, where ornaments are not required, but where strength is the principal object The proportion of the Tuscan column, with its pedestal and entablature, is as follows —Divide the whole height of the entire column into five equal parts, one of which is for the height of the pedestal, and the remaining four are assigned for the base, shaft, capital, and entablature The whole height being divided into five equal parts, one is given for the entablature, and the remaining four being divided into seven equal parts, one is for the inferior diameter of the shaft * Take half of the inferior diameter for the height of the base, including the plinth, and the same for the height of the capital, exclusive of the astragal Take the inferior diameter, and divide it into 60 equal parts, which are called minutes, and by which the smaller parts of the column are proportioned in their height and projections, as specified in the upright and horizontal scales attached to the profile, from which the several proportions of each moulding must be learned A module is considered by some to be only half a diameter, but others extend it to a whole one, which we have adopted as the most simple and entire Palladio uses the whole diameter in every order except the Doric Vitruvius also employs the large module, reckoning the proportion of the column by the lower or inferior diameter of the shaft, and we do not see that either the semidiameter or the 20 minutes contrived by some will more nearly answer to the different part of the column

Sect IV *Of the Intercolumniation of the Orders*

Columns are either engaged or insulated, and when insulated or detached from the wall they are either very near, or at a considerable distance from it When they are placed at a considerable distance from the wall, they are

* In massive buildings, a more heavy entablature may be used, as was customary amongst the ancients They divided the whole height assigned to the base, shaft, capital, and entablature, into four equal parts, and gave one to the entablature The profiles of Vignola and Palladio have this proportion

destined to support the entablature, and their distance from each other should be consistent both with their real and apparent solidity Engaged columns are attached to the wall, and are not limited in their intercolumniations, as they depend on the breadth of the arches, doors, windows, niches, or other decorations placed in them

The ancients used five different species of intercolumniations, which, according to Vitruvius and Palladio, are as follows —

The pycnostyle, of which the interval is one and a half of the inferior diameter of the column

The systyle, whose interval or space is two diameters

The eustyle, two diameters and a quarter

The diastyle, three diameters—and

The araeostyle, four diameters

The three first of these were used by the Grecians, in the Doric, Ionic, and Corinthian orders, but the distances of the triglyphs of the Doric determined the intercolumniations of that order, which we shall describe in its place

The ancient Romans preferred the eustyle in most cases, as being the best medium of the too little and too great intervals of columns, but in their Tuscan works, they used a space equal to four and sometimes six diameters, which intercolumniation was admissible in this order, since the architrave was usually formed of some kind of timber, when the other parts of the entablature were of stone Palladio says, this intercolumniation of the Tuscan order was adapted to farm houses and other rustic works, as it afforded a passage for carts, and was attended with the least expence In structures built entirely of stone, they, however, used a shorter interval, more suitable to the length of their marble blocks, and more agreeable to the ponderous fabric which they occasionally supported, for which reason the diastyle and eustyle modes were sometimes applied to this order The moderns have indeed adopted these two as their general rule, and apply them to every order except the Doric The aracostyle, however, is sometimes, by a modern contrivance authorised by a few examples of the ancients, introduced in porticoes and peristyles This mode of the araeostyle is from Perrault, and is managed by placing two columns together at the angles, so close as to admit the two capitals nearly into contact This manner, which is termed grouping, takes off from the excessive width of this kind of interval, whilst it adds to it both real and apparent strength, as is exemplified in St Paul s church in London, and in the palace of the Louvre at Paris

Sect V *Of Arches and their Ornaments*

Arches are not so magnificent as colonnades, but they are more solid and less expensive They are proper for triumphal entrances, gates of cities, of palaces, of gardens, and of parks, and, in general, for all openings that require an extraordinary breadth

There are various manners of adorning arches Sometimes their piers are rusticated, sometimes they are adorned with pilasters, termini, or caryatides, and sometimes they are made sufficiently broad to admit niches or windows The circular part of the arch is either surrounded with rustic key-stones, or with an archivolt enriched with mouldings, which, in the middle, is sometimes interrupted by a console, or mask, serving at the same time as a key to the arch, and as a support to the architrave of the order The archivolt is sometimes supported by an impost, at the head of the pier, and at others by columns placed on each side of it, with a regular entablature, or architrave and cornice There are likewise instances of arcades without piers, the arches being turned on single columns as in the temple of Faunus at Rome, &c But this practice ought to be seldom imitated, as it is neither solid nor handsome

The void or aperture of arches should never be higher, nor much lower, than double their breadth, the breadth of the pier should seldom exceed two thirds, nor be less than one-third of the breadth of the arch, and the angular pier ought to be broader than the others, by one half, one-third, or one-fourth the impost should not be more than one-seventh, nor less than one-ninth of the aperture, and the archivolt must not be more than one-eighth, nor less than one-tenth of it The breadth of the console must, at the bottom, be equal to that of the archivolt, and its sides must be drawn from the centre of the arch the length of it must not be less than one and a half of its smallest breadth, nor more than double The thickness of the pier depends on the breadth of the portico, for it must be strong enough to resist the pressure of its vault But with regard to the beauty of the building, it should not be less than one-quarter of the breadth of the arch, nor more than one-third These are the general dimensions of arches

The proportions peculiar to the Tuscan arch, of which we have given an example, without pedestals, are as follows In height, their aperture is 7 diameters and a quarter, in width 4, and from centre to centre of the columns, 6 diameters According to the preceding remarks, the archivolt and imposts are half a diameter, and from the top of the archivolt to the underside of the architrave should not be less than 15 minutes The breadth of the key-stone at the bottom is equal to its archivolt, and its spreading sides are determined by lines drawn from the centre of the arch, as is shewn in the plate The plinth is one diameter in height, and the proportions of the column and entablature are the same with the Tuscan profile For the proportions of the moulding of the archivolt and imposts, (see pl 17)

The Tuscan arch with pedestals is in width 4 and a half, and in height 8 diameters and a quarter, and from centre to centre of each pier is 6 and three quarters In every other particular they are subject to the preceding rules

Sect. VI *Of the Origin, Character, Use, and Proportions of the Doric Order*

This order owed its name to the Dorians, a people who inhabited one of the Grecian districts, and from whom it doubtless received the proportions and derived most of the parts by which it has been distinguished from orders of later date

The Doric, as to its character, is by architects considered grave, robust, and of masculine aspect hence it is figuratively termed the Herculean order

The ancients employed this order in their temples dedicated to Juno, Minerva, Mars, and Hercules, whose grave and heroic dispositions suited well the solemn character of this order It may be properly used in colonnades, porticos, halls, gates of cities, and public buildings erected in memory of heroes or famous personages In most of the antiques, the Doric column is executed without a base Vitruvius indeed makes it without one, the base, according to him, having been first employed in the Ionic order, in imitation of the sandals worn on women s feet Scamozzi blames this practice, and most of the moderns are of his way of thinking In conformity to the arguments of Leclerc, and agreeably to the practice of Palladio and of our modern architects, we have introduced an attic base to this order, yet, in ornamental temples, for gardens, &c we are decidedly of opinion, that the Grecian style should be copied strictly and preserved chaste, according to the remains of antiquity, as discovered by both ancient and modern architects, who have with great diligence and expence explored their ruinous piles, to obtain accurate measurements of the several parts, particularly our countryman, James Stuart, esq. who, in three folio volumes, has presented to public view the antiquities of Athens, in which we have a clear display of pure Grecian architecture. In these we see, as well as in other works, that the Doric column was without a base, but its shafts decorated with a number of channellings or flutings peculiar to itself for in the other orders, an interval or fillet is introduced between each fluting, but in this it is otherwise Hence Scamozzi s censure that this manner of fluting is imperfect, in consequence of the projecting angles which separate each flute, which renders the shaft tender and more subject to decay The force of this objection however will be greatly abated, when it is considered that these flutings are shallow, having their centre from the summit of an equilateral triangle, whose sides are equal to the width of the flute, consequently, it is little more than one quarter of the depth of the other kinds of flutings which are perfect semicircles.

The other members which mark the peculiar feature of this order, are the triglyph and mutule. The mutules are considered as a memorial, or imitation of the primitive huts [illegible]), whose beams are seen to project under the roof, but the triglyph is thought by some to be emblematical of the use of the first temple erected according to this order, which was dedicated to Apollo, to whose harp the triglyph bears some sort of resemblance The metope, or spaces between the triglyphs, have been variously enriched Palladio has introduced oxes sculls, with lighted torches hanging from each horn, and placed alternately with pateras, expressive of the sacrificial offerings performed to the heathen deities

Other ornaments may, however, be introduced with propriety, both in public and private buildings In the latter, crests and badges of dignity, heads, vases, or pateras, encircled with garlands of oak or laurel, are very suitable, in military structures, heads of Mars, Medusa, or the Furies, may be admitted

Of the principal parts which compose this order, the following are the proportions The whole height of the entire order is divided into five equal parts, one of which is the height of the pedestal, and the remaining four, which are assigned to the column and entablature, are likewise to be divided into five One of these belongs to the entablature, and the remaining four being divided into eight equal parts, one of them will be the inferior diameter of the column Or we may express it thus The whole height of the order, including its pedestal, is twelve modules and a half, reckoning the module a whole diameter The pedestal is two and a half, the base, shaft, and capital, eight, and the whole entablature two modules Dividing the large diameter into sixty equal parts, called minutes, thirty are given to the base, thirty to the capital, thirty to the architrave, forty five to the metope, and forty-five to the height of the cornice, including the upper fillet or capital of the triglyph In this order, when the mutules are introduced in the entablature, as in the example referred to, one module is assigned for the projection of the cornice, which in this respect exceeds any of the other orders The projection of the mutules is equal to their width, being thirty minutes the width of the triglyphs is exactly the same, and their distance from each other equal to the height of the metope, which, by this division, forms a perfect square The sides of the channels of the triglyphs are at right angles with each other The soffit of the mutule, and that of the corona, are frequently ornamented, the former with conical drops similar to those under the triglyphs, and the latter with roses in square and lozenge compartments The proportions of the smaller parts, and of the several mouldings which compose the whole, must in this, and in every other order, be learned from their respective profiles

Sect VII *Of the Intercolumniation and Arches of the Doric Order*

The intercolumniation of this order is often attended with peculiar difficulty, arising from the strict regard that is ever paid to the due width of the triglyph, and the perfectly square

form of the metopes, or their intervals Besides, that it is absolutely requisite, that a triglyph should be placed exactly over the centre of every column For these reasons, the mutules and triglyphs have been omitted in capital works, both ancient and modern, as in the Coliseum at Rome, and the Royal Hospital at Greenwich

Palladio has, however, given one instance of an ancient temple with angular triglyphs This structure, which he terms the Temple of Piety, is mentioned by Vitruvius, with an eye to the difficulty occasioned by the triglyphs being thus placed, which reduces the intercolumniation of the two angular columns to one diameter and a quarter, which is less than the pycnostyle The next intercolumniation is still greater, approaching nearly to the pierostyle, as is evidently necessary to bring the triglyph over the centre of the third column from the angle The next, which is the centre intercolumniation, and faces the entrance of the temple, is rather more than eustyle, or two diameters and a quarter, and has, in the metopes, ditriglyph But the intervals between the triglyph are much too narrow for their height, so as to produce an unfavourable effect The other spaces are monotriglyph, and are perfect The regular intercolumniation of the Doric order is the monotriglyph, or pycnostyle, which admits of one between two columns The ditriglyph, or eustyle, admits two, and the araeostyle is tritriglyph, or consisting of three, but the most perfect of these is the ditriglyph

When the capitals and bases of coupled Doric columns have their proper projections, and are at any distance from each other, the metope between them will be rather too wide, but that may be avoided by confining the projections, or making the triglyph one minute more than it really should be, and placing or removing its centre a minute within the axis of the column which trifling differences will not be perceived without the nicest examination

Doric arches, without pedestals (see pl 17), are seven diameters and three-fourths high, and in width four diameters and 15 minutes The piers are two modules in front, and in thickness one module 22½ minutes, or in proportion to their distance from the wall From centre to centre of each pier is 6 diameters and 15 minutes Arches of this order, with pedestals, have their apertures, in height, 9 diameters and 30 minutes, and in their width, 5 diameters 15 minutes The piers are 2 diameters 15 minutes wide in front, and from centre to centre of each, is 7 diameters and 15 minutes

Sect VIII *Of the Origin, Character, Use, and Proportions of the Ionic Order, with the Manner of describing its Volutes*

The Ionic order owes its invention to the people of Ionia, who inhabited a Grecian district and is said to have been first employed in the decorations of the temple of Diana, at Ephesus

The Ionic column is more slender and graceful than the Doric Its ornaments are truly elegant, being in a style of composition between the richness of the Corinthian and the plainness of the Tuscan orders Its general appearance being simple, yet graceful and majestic, in figurative language, it has been compared to a sedate matron, in decent, rather than in rich attire

In forming the profile, and in adjusting the proportions of this order, most of the modern architects have, in a great degree, imitated the columns, capitals, and entablatures, in the temple of Manly Fortune and Concord, in the theatre of Marcellus, and the Coliseum at Rome Amongst the ancients, the form of the Ionic profile appears to have been more positively determined than that of any other order. for in all the antiques at Rome, except in the temple of Concord, it is exactly the same

The proportions of the principal parts of the Ionic column are as follow The height of the entire order is divided into five equal parts One of these parts is assigned to the height of the pedestal, and the remaining four are divided into six, for the column and entablature One of these is appropriated to the entablature, and the remaining four are for the column, including its capital and base These four being divided into equal parts, one is assigned for the inferior diameter The cornice is 44 minutes in height, and its projection the same The drip in the underside of the corona is channelled out one minute deep, and two minutes from the front, and before the cyma reversa, one minute The shaft of the column is sometimes fluted and sometimes plain Twenty, or twenty-four, are the number of flutes allotted, not only to this, but to every other order In general, however, 24 are preferable The plan of the flutes may be rather more than a semicircle, as they will then appear more distinct The fillets, or intervals between them, must not be broader than one-third of the flutes, nor less than one-fourth and it should farther be observed, that in the capital of rich compositions over each flute, is placed an ove or egg For the other particulars, recourse must be had to the plate In exterior works, when the building is large, the entablature may be enlarged to one fourth of the whole height of the column without its pedestal, as was sometimes practised by the ancients Palladio, however, makes no distinction of this nature, but allows only one fifth part of the height of the column in all cases

The volute, which is a very principal member of this column, is executed in various forms The Grecian volute has a double fillet winding round to its eye, which, by the partings or spaces between, produces a variety of light and shade, and affords to the whole convolution additional grace and beauty.

The manner of drawing the volute, according to Goldman s method, is as follows (see pl 16) Draw the perpendicular F A, termed the cathetus, and make its length equal to 15 minutes On the centre describe a circle,

whose diameter is 3¼ minutes Draw next a geometrical square, having its sides equal to the radius of the circle, as 1, 2, 3, 4. From the angles 2, 3, draw diagonals to the centre at C Divide the side of the square 1, 4, into 6 equal parts, as at 5, 9, 12, 8, and from these points draw parallel lines to the diagonals, as shewn in the eye of the volute, whence will be obtained 12 centres, by which every arch composing the volute may be accurately drawn, each of them coinciding with the other Thus, on the centre 1, fix one foot of the compass, and extend the other to F, and with this opening, describe the arch F G On the centre 2, with the other foot extended to G, describe the arch G H On the centre 3, extending it to H, describe the arch H I, and on the fourth centre describe the arch I K, which completes one revolution Proceed then in the same way, to the centres 5, 6, 7, 8, for the second revolution, and to 9, 10, 11, 12, for the third revolution Thus it appears, that the whole convolution consists of 12 quadrants of circles of so many different diameters

To graduate the fillet, construct a triangle at O, of which the side F A is equal to that part of the cathetus, contained from A to F, and the side V F, equal to half the side of the square in the eye of the volute a, C, 1 Draw then the line S T, at a distance from V F, equal to the breadth of the fillet at F S, which may be 2 minutes, or 1 and ⅞ths Take the space S T, and place it each way from the centre of the volute, as from C to 3 Divide S T into three equal parts, as at 1, 2, 3, in the eye of the volute, and from these points draw parallel lines to the diagonals, which will find 12 new centres, and proceeding from one to the other, as was done in drawing the exterior contour, the regular diminution of the fillet may be accurately performed

With respect to the intercolumniation of this and the succeeding orders, what has been observed on the subject, in a former section, may suffice and as to the arches peculiar to each order, all that is necessary, after what has been remarked on the two preceding orders, is a careful inspection of the plates, where we have marked the peculiar proportions in so many whole diameters, or parts of a diameter or module

Sect IX *Of the Origin, Character, Use, and Proportions, of the Composite Order*

This order had its origin amongst the ancient Romans, and Serlio is said to have been its inventor In its style of composition it partakes of the Ionic and Corinthian orders, but mostly of the latter, particularly in the leaves of its capital Some architects, however, do not incline to speak well of this order, merely on the principle of its being a composition from the others But this, in itself, is not a sufficient ground for objection, since the same may be said of the Tuscan order, which is a composition from the rude state of the Doric On the other hand, we freely acknowledge, that the Composite order is so complete an imitation of the Corinthian, that at first sight, the little difference between them will even deceive the eye of a tolerable judge This at once pronounces the composition at least defective, if not bad, for why are two orders of architecture scarcely to be discriminated, but by the eye of a skilful architect?

The general proportions of this order are as follow The height of the entire order is divided into five equal parts, one of which is appropriated for the height of the pedestal, and the remaining four, for the column and entablature These four parts being again divided into six, one is for the entablature, and the remaining five, for the height of the column, including its base and capital The height of the column is divided into 10 equal parts, one of which is given to the inferior diameter The base is 30 minutes, the capital 70 in height, adorned with acanthus leaves, and volutes, drawn by the same method as those of the Ionic and the plan of the capital is the same with that of the Corinthian order

The soffit of the corona is divided into square compartments cut out of the solid, decorated with roses whose relief must not project more than the borders which inclose them In rich compositions, the soffits of the modillions are also ornamented, but their relief is not to exceed the horizontal surface, which would greatly injure the effect of the modillion, and render the appearance of the profile of the entablature less pleasing

Sect X *Of the Origin, Character, Use, and Proportions, of the Corinthian Order*

The city of Corinth gave birth to this finest of all architectural compositions, in which we see proportion, simplicity, elegance, and richness, combined to a degree almost exceeding imagination, and which we are persuaded will never be surpassed, whilst architecture has an existence This order is, and will continue to be, a perpetual memorial of the exquisite taste and genius of an ancient Grecian people Scamozzi calls it the virginal order, an epithet truly characteristic of the delicacy and tenderness of composition apparent in the whole Conformably to the whole of its character, the ancients employed it in works of magnificence, grandeur, and delicacy It obtained a place in palaces, public squares, banqueting rooms, theatres, and the apartments of young ladies It was also generally used in temples dedicated to female deities, and sometimes in those of Jupiter, Mars, and Mercury

The most perfect model of the Corinthian order is generally allowed to be shewn in the three columns in the Campo Vaccino at Rome the remains, as it is supposed, of the temple of Jupiter Stator

The base of the column may be either Attic or Corinthian, since both are beautiful The entablature is generally much enriched, particularly by the ancients, who introduced in the freeze representations of various figures (see pl 4) A very full display of the same may be found in Stuart's Antiquities of Athens

When the entablature is thus enriched, the columns are fluted, and the flutings may be filled with cablings, one third, from the bottom, of the whole height of the shaft, as in the inside of the Pantheon In most of the antiques at Rome, the capital of this order is decorated with olive-leaves, the acanthus being seldom employed but in the Composite

The general proportions of this order are as follow —The whole height of the entire order is divided into five equal parts, and one is given for the height of the pedestal The remaining four are divided into six equal parts, one is assigned for the entablature and the remaining five are assigned to the height of the column including its base and capital, which are again divided into equal parts, one of which is for the inferior diameter The base is 30 minutes, and the capital 70, in height The cornice is 48 minutes, both in height and projection

The soffit of the corona is worked in square compartments, as in the Composite, but the soffit of the modillion is ornamented with an olive-leaf, the same as in the capital The breadth of the modillion is 10 minutes and a half, and the space between each modillion twice their width

The abacus of the capital is sometimes plain, and sometimes fluted, as in this profile In some capitals the volutes rise higher than the underside of the abacus, but the capital looks best when they are bounded by its under surface

To determine the plan of a capital according to the ancients, draw a geometrical square whose sides are one diameter and a half To this square draw diagonals, and on these, place from the centre, or their intersection, a space equal to one diameter, through which point lines being drawn at right angles with the diagonals, will determine both the projection and thickness of the volutes For the curvature of the abacus, extend the compasses from one angle to the other of the side of the abacus, and with this opening, intersect two arches described from the angles of each horn of the abacus, and the point of intersection will be the centre, by which, with the same opening of the compasses, the concavity of the abacus will be accurately drawn

Sect XI *Of Pilasters in general*

Pilasters differ from columns only in their plan which is a square as that of columns is round Their bases, capitals, and entablatures, have the same parts, with the same heights and projections as those of columns they are also distinguished in the same manner, by the names of Tuscan, Doric, Ionic, Corinthian, and Composite

The column is undoubtedly more perfect than the pilaster However, they may be employed with great propriety on many occasions Some authors declaim against pilasters, because, according to them, they do not admit of diminution But this is a mistake, there are many instances, in the remains of antiquity, of their being diminished Scamozzi always gave his pilasters the same diminution as his columns Palladio and Inigo Jones have likewise diminished them in many of their buildings

Pilasters are employed in churches, galleries, halls, and other interior decorations, to save room, for, as they seldom project beyond the solid wall above one quarter of their diameter, they do not occupy near so much space as columns They are likewise used in exterior decorations, sometimes alone, instead of columns, on account of their being less expensive, and sometimes they accompany columns, being placed behind them to support the architraves, where they enter the building, as in the Pantheon at Rome, or in the same line with them, to fortify the angles, as in the Portico of Septimius

When pilasters are used alone, they should project one quarter of their diameter beyond the walls When placed behind columns, especially if they be very near them, they need not project above one eighth of their diameter But, when placed on a line with columns, their projection must be regulated by that of the columns, and, consequently, it can never be less than a semidiameter, even when the columns are engaged as much as possible

The shafts of pilasters are frequently adorned with flutings, in the same manner as those of columns the plan of which may be a trifle more than a semicircle their number must be seven on each face, which makes them nearly of the same size with those of columns The intervals or fillets, must either be one third or one fourth of the fluting in breadth

The capitals of pilasters are profiled nearly in the same manner as those of columns

Sect XII *Of Attics*

These very properly follow the pilasters, being nothing more than square pillars with their cornices They had their origin in Athens, where it was for many ages a rule in building to conceal the roof For this purpose, nothing served so well as a kind of low or little order ranged in a continued line, singly, or with the interruption of balusters, which, rising above the rest of the work and before the roof hid it perfectly, and placed something agreeable in view The place of attics, therefore, is at the uppermost extremity of a building, to which they serve as a crown, or very properly make a finishing for the other orders when they have been used in the structure They must never stand under any thing except such ornaments as are placed at the very top These attics should never exceed in height one third of the height of the order on which they are placed, nor be less than one quarter of it The base, dye, and cornice, of which they are composed, may bear the same proportions to each other as those of pedestals do, and the base and cornice may be composed of the same mouldings as those pedestals Sometimes the attic is continued throughout; at others, it projects, and forms a pilaster over each column of the order The breadth of this pilaster is seldom made narrower than the upper diameter

of the column below it, and never broader. Its projection may be equal to one quarter of its breadth.

Sect XIII *Of Pediments*

Pediments, among the Romans, were used only as coverings to their sacred buildings, till Cæsar obtained leave to cover his house with a pointed roof, after the manner of temples In the remains of antiquity we meet with two kinds of pediments, the triangular and the circular The former of these are promiscuously applied to cover small or large bodies but the latter, being of a heavier figure, are never used but as coverings to doors, niches, windows, or gates

As a pediment represents the roof, it should never be employed but as a finishing to the whole composition

The ancients introduced but few pediments into their buildings, usually contenting themselves with a single one to adorn the middle or principal part But some of the moderns, and particularly the Italians, have been so immoderately fond of them, that their buildings frequently consist of scarcely any thing else

The girder being a necessary part in the construction of a roof, it is an impropriety to intermit the horizontal entablature of a pediment, by which it is represented, to make room for a niche, an arch, or a window

In regular architecture, no other form of pediments can be admitted besides the triangular and circular Both of them are beautiful, and when a considerable number of pediments are introduced, and when a range of windows are adorned with them, these two figures may be used alternately, as in the niches of the Pantheon, and in those of the temple of Diana at Nismes.

The proportion of pediments depends upon their size, for the same proportions will not do in all cases.

When the base of the pediment is short, its height must be increased, and when the pediment is long, the height must be diminished The best proportion for the height is from one-fifth to one-fourth of the base, according to the extent of the pediment, and the character of the body it covers The materials of the roof must also be attended to, for if it be covered with tiles, it will be necessary to raise it more than one quarter of the base, as was the custom of the ancients in their Tuscan temples

The tympan is always on a line with the front of the frieze, and when large, admits of various ornaments

Sect XIV *Of Gates, Doors, and Piers*

There are two kinds of entrances, viz doors and gates The former serve only for the passage of persons on foot, but the latter likewise admit horsemen and carriages Doors are used as entrances to churches and other public buildings, to common dwelling houses, and apartments: and gates serve for inlets to cities, fortresses, parks, gardens, palaces, &c, The apertures of gates being always wide, they are generally made in the form of an arch, that figure being the strongest But doors, which are generally of small dimensions, are commonly parallelograms, and closed horizontally The general proportion for the apertures, both of gates and doors, whether arched or square, is, that the height be about double the breadth.

The most common, and indeed almost the only ornaments for gates are the piers by which they are supported, and which were originally no more than bare posts into which the hinges of the gate were driven Though this, however, is the only proper use of piers, it must be concealed as much as possible, and they must seem as if placed there only for ornament As they are to be fixed to the wall before the house, so they must also be proportioned to it, and as they are to be seen in the same view with the front of the house, their correspondence with it is equally necessary They are to be placed on a plinth, and something must be allowed by way of ornament and finishing at the top All the luxuriance of fancy may be employed in the decoration of piers but it will be proper to observe this general rule, that the pier being an inferior building, it must never be richer than the front of the house If, for instance, the front of the house is ornamented with columns of the Doric order, the Ionic must not be used in the piers, and it will be found better to omit columns altogether, than to make use of the Tuscan order for piers in any case If the Ionic or Corinthian orders are employed in the front of the house, the Doric or Ionic may be used with propriety in the piers One piece of ornament is almost universal in piers, namely, a niche with its seat, made as if for the convenience of weary travellers On this account it will be proper to raise the columns on pedestals, because the continued moulding from their cap will be a good ornament under the niche The base of the columns ought always to be attic

Inside-doors, however small the building may be, should never be narrower than two feet nine inches, nor should they ever, in private houses, exceed three feet six inches in breadth, which is more than sufficient to admit the bulkiest person Their height should at least be six feet three or four inches, otherwise a tall person cannot pass without stooping In churches, palaces, &c where there is a constant ingress and egress of people, the apertures must be larger The smallest breadth that can be given to a gate is 4½ or nine feet, which is but just sufficient for the passage of a coach

Sect XV *Of Niches and Statues*

It has been the custom of every age to enrich different parts of buildings with representations of the human body Thus the ancients adorned their temples, baths, theatres, &c with statues of their deities, heroes and legislators The moderns still preserve the same custom, placing in their churches, palaces, &c statues of illustrious persons, and even groups composed of various figures, representing occurrences collected from history, fables, &c Sometimes

these statues or groups are detached, raised on pedestals, and placed contiguous to the walls of a building, or in the middle of a room, court, or public square. But they are most frequently placed in cavities made in the walls, called niches. Of these there are two sorts; the one formed like an arch in its elevation, and semicircular or semielliptical in its plan, the other is a parallelogram both in its plan and elevation.

The proportion of both these niches depends on the characters of the statues, or the general form of the groups placed in them. The lowest are at least a double square in height; and the highest never exceed 2½ of their breadth.

With regard to the manner of decorating them, when they are alone in a composition, they are generally inclosed in a pannel, formed and proportioned like the aperture of a window, and adorned in the same manner. In this case the niche is carried quite down to the bottom, but on the sides and at the top, a small space is left between the niche and the architrave of the pannel. And when niches are intermixed with windows, they may be adorned in the same manner with the windows, provided the ornaments be of the same figure and dimensions with those of the windows.

The size of the statue depends on the dimensions of the niches. They should neither be so large as to have the appearance of being rammed into the niches, as in Santa Maria Maiora at Rome, nor so narrow as to seem lost in them, as in the Pantheon. The distance between the outline of the statue and side of the niche should never be less than one-third of a head, nor more than one-half whether the niche be square or arched, and when it is square, the distance from the top of the head to the cieling of the niche should not be greater than the distance on the sides. Statues are generally raised on a plinth, the height of which may be from one-third to one-half of a head, and sometimes where the niches are large, the statues may be raised on small pedestals.

The character of the statue should always correspond with the character of the architecture with which it is surrounded. Thus, if the order be Doric, Hercules, Jupiter, Mars, Æsculapius, and all male statues, representing beings of a robust and grave nature, may be introduced, if Ionic, then Apollo, Bacchus, &c. and if Corinthian, Venus, Flora, and others of a delicate nature, should be employed.

Sect. XVI. *Of Chimney-Pieces.*

The size of the chimney must be regulated by the dimensions of the room where it is placed. In the smallest apartments, the breadth of the aperture should never be less than three feet, or three feet six inches. In rooms from 20 to 24 feet square, or of equal superficial dimensions, it may be from 4 to 4½ feet broad, in those of 24 to 27, from 4½ to 5, and in such as exceed these dimensions, the aperture may even be extended to 5½ or 6 feet.

The chimney should always be situated so as to be immediately seen by those who enter the room. The middle of the partition-wall is the most proper place in halls, saloons, and other rooms of passage, but in drawing-rooms, dressing-rooms, and the like, the middle of the back-wall is the best situation. In bed-rooms, the chimney is always in the middle of one of the partition-walls; and in closets and other very small places, to save room, it is put in a corner. Wherever two chimneys are used in the same room, they should be placed either directly facing each other, if in different walls, or at equal distances from the centre of the wall in which they both are.

The proportion of the apertures of chimney-pieces of a moderate size is generally a perfect square, in small ones it is a trifle higher, and in large ones a trifle lower. Their ornaments consist in architraves, friezes, cornices, columns, pilasters, termini, caryatides, consoles, and all kinds of ornaments of sculpture, representing animals and vegetables, &c. likewise vases, chalices, trophies of arms, &c. In designing them regard must be had to the nature of the place where they are to be employed. Such as are intended for halls, saloons, guard-rooms, galleries and other large places, must be composed of large parts, few in number, of distinct and simple forms, and having a bold relief, but chimney-pieces for drawing rooms, dressing-rooms, &c. may be of a more delicate and complicated nature.

Sect. XVII. *Of Staircases.*

Staircases are the means of ascending to the different stories of a building, and ought to be so constructed as to make the ascent safe, agreeable, and easy.

To fix on a proper and advantageous situation for a staircase is often attended with difficulty, but without which the internal convenience and beauty of a house will be much injured. Palladio is of opinion, that the entrance to a staircase ought to be situated so as the principal parts of a building may be seen before we ascend the steps; and upon this principle it is observable, that a more easy access is gained to the principal apartments on the ground-floor.

To render stairs easy of ascent, the height of a step ought not to exceed seven inches, nor in any case to be less than four, but six inches is a general height. The breadth of the steps should not be less than 12 inches, if it can possibly be avoided, nor should they ever be more than 18, and to render our ascent free from the interruption of persons descending, their length should not exceed 12, nor be less than four feet, except in common and small buildings, whose area will not admit of a staircase of more than three feet.

That the ascent may be both safe and agreeable, it is requisite also to introduce some convenient aperture for light, which ought to be as nearly opposite to our first entrance to the stairs, as the nature of the building will admit of. An equal distribution of light to each flight of stairs ought to be particularly regarded, for which reason, these apertures or windows

are commonly placed at the landings or half-spaces, though sometimes the whole is lighted from a dome

Staircases are of various kinds, whose plans are circular Some wind round a newel in the middle, and the risers of the steps are straight, and sometimes curved. Others have their plan circular, but form a well in the centre The same may be observed of those whose plans are elliptical the most common, however, are those whose plans are a square or parallelogram. The ancients paid a superstitious regard to an odd number in their flights of steps, as 3, 5, 7, &c. in order that in their ascent, they might begin and finish with the right foot Palladio, therefore, allows to the staircase of a dwelling-house 11 or 13 steps to each flight

When a staircase winds round a newel or column, whether its plan be circular or elliptical, the diameter being divided into three equal parts, two are set apart for the steps, and one for the column But in circular or elliptical staircases that are open, or which form a well in the middle, the diameter is divided into four equal parts, two for the steps, and two for the void space or well in the centre Modern staircases, however, have often a kind of well or mixed form, straight on each side, and circular at the returns of each flight The openings of these wells are various in width, but seldom exceed 18 or 20 inches

Sect XVIII *Of Ballustrades*

Ballustrades are sometimes of real use in buildings, and at other times they are only ornamental Such as are intended for use, as when they are employed in staircases, before windows, or to enclose terraces, &c must always be nearly of the same height, never exceeding three feet and a half, nor ever less than three. But those that are principally designed for ornament, as when they finish a building, should be proportioned to the architecture they accompany, and their height ought never to exceed four-fifths of the height of the entablature on which they are placed nor should it ever be less than two-thirds thereof, without counting the zocholo, or plinth, the height of which must be sufficient to leave the whole ballustrade exposed to view

The best proportion for ballustrades is to divide the whole given height into thirteen equal parts; eight of these for the height of the balluster, three for the base, and two for the cornice or rail or into fourteen (if it be required to make the balluster less,) giving eight parts to the balluster, four to the base, and two to the rail One of these parts may be called a module; and being divided into nine minutes, may serve to determine the dimensions of the particular members.

In ballustrades, the distance between two ballusters should not exceed half the diameter of the balluster measured in its thickest part, nor be less than one third of it.

The breadth of the pedestals, when they are placed on columns or pilasters, is regulated by them; the dye never being made broader than the top of the shaft, nor much narrower, and when there are neither columns nor pilasters on the front, the dye should not be much lower than a square, and seldom higher On stairs, or any other inclined planes, the same proportions are to be observed as on horizontal ones

Sect XIX *Of Orders upon Orders, and of Basements*

We have already, in speaking of the Composite order, described the regular succession that should be observed, from the ground upwards, and therefore we have now only to observe, that in placing columns upon one another, the axis of every column should be perpendicular to each other, at least they must be so in the front view With regard to the proportions of columns placed above each other, Scamozzi's rule, that the lower diameter of the superior column ought constantly to be equal to the upper diameter of the inferior, is universally esteemed the best, and gives all the columns the appearance of one long tapering tree cut into so many pieces

In this country, however, we have few examples of more than two stories of columns in the same elevation, for when there are three, it is impossible to avoid some striking inconsistencies, or to preserve the character of each order in its intercolumnial decorations since the intervals of the upper columns must become too wide, and would neither appear graceful nor solid

But, instead of employing several orders, one above another, the ground floor is, in some cases, made in the form of a basement, on which the order that decorates the principal story is placed The proportions of these basements are not fixed, but depend on the nature of the rooms on the ground floor In some structures, the height of the basement is equal to that of the first order In some buildings, it does not exceed two-thirds of the order, and in others is only half its height Basements should never be higher than the columns they support, nor less than one half of their height

It is usual for basements to be decorated with rustics, whose height, including the joint, should be half a diameter of the order placed upon them Their figures are from a square to a sesquialtera, and their joints may be either square or chamfered The square joint is one-eighth of the height of the rustic, and in depth they are equal to their width, those that are chamfered must form a rectangle, and their joints are one fourth of the width of the flat part of the rustic.

Sect XX *Of Roofs and their Coverings*

Before we can proceed in the business of roofing, a plan of the building to be covered should be made, by which we may be able to ascertain the lengths of the various timbers required for the whole The particular kinds of covering practised in England are lead, pantiles, plain tiles, and slates Coverings of lead

are doubtless the best and most durable of any other; but on account of their expence they are seldom chosen, except for magnificent buildings. Lead is most generally used on roofs of a very flat pitch, where any other sort of covering would not be safe. The pitch or perpendicular height of such roofs is about 2-9ths of the width of the building, or rather under what is termed pediment pitch. Lead however is now mostly used for perfectly flat coverings. Pantile coverings may also be used to low roofs; but their general pitch ought to be about 3-8ths of the width of the building. Coverings of plain tiles and slates are generally allowed the highest pitch, because when they are laid on low roofs, the rain will more easily find its way between them. These ought to have a pitch, the length of whose rafters is 3-4ths of their girder; or at least, the sides of the roof ought to be at right angles with each other. There are also various kinds of circular roofs; but those most generally in use are formed in the manner now described, having square or oblong plans, and timber frames.

When beams exceed 20 feet in extent, they should be trussed up in one or more places, as may be required. Beams should never exceed 15 feet in bearing, nor rafters more than 10 feet, and especially in roofs of very low pitch, whose coverings have a much greater pressure on their rafters, than those of higher pitches, and which may therefore exceed 10 feet.

If the length of a beam of fir be 30 feet, its scantlings may be 7 inches deep and 6 inches thick.

If 45	9	——	7	——
60	10	——	8½	——
75	10½	——	10	——
90	12	——	10½	——

If the length of a principal rafter be 24 feet, its scantlings may be

6 inches deep and 5 in thickness.

If 36	7	——	6	——
41	9	——	7	——
60	10	——	7½	——
72	10	——	9	——

Rafters of these dimensions are generally made about one inch larger at the bottom both in depth and thickness, which strengthens the roof by admitting larger tenons into the principal beams, and by becoming lighter at the top.

If the rafters be small, as 8 feet in length, their scantlings may be 4½ inches by 3 inches thick.

If 10	5	——	3	——
12	6	——	3	——

Sect. XXI. *Of Cielings.*

Cielings in churches and temples may be considered as the interior coverings of their roofs, as there is nothing between them but the necessary framing by which the whole is supported. For dwelling-houses the simplest and most common sort are those which are flat. These are generally adorned with principal compartments, surrounded with mouldings, either let into the cieling or projecting from it. Their ornaments and mouldings do not require a bold relief; but being near the eye, they must be finished with neatness and taste.

Coved cielings are certainly more beautiful than flat ones; but their execution is attended with more expence. They are used promiscuously in large and small rooms, and occupy from one-fifth to one-third of the height of the room. But where the architect is at liberty to proportion the height of the room to its superficial dimensions, the most eligible proportion for the cove is one-fourth of the whole height of the room. The figure of the cove is commonly either a quadrant of a circle or of an ellipsis, taking its rise a little above the cornice, and finishing at the border round the great pannel in the center. The border projects somewhat beyond the coves on the outside; and on the side towards the pannel, it is generally made of sufficient depth to admit the ornaments of an architrave.

When the profiles of rooms are gilt, the cielings ought likewise to be gilt. The usual method is to gild all the ornaments, and leave the ground white, pearl-colour, light blue, or any other that may be proper to set off the gilding to advantage.

Historical and other paintings are often introduced with good effect in the centre and angular compartments of large cielings; and of late an invention of painted silk and satin in various ornaments from the antique has been introduced, to adorn the profiles or walls of rooms. These are inclosed in pannels, pilasters, and tablets, according to their situation; and, when they have suitable gilt mouldings, produce a very pleasing and splendid effect.

OF THE CONSTRUCTION AND PRINCIPLES NECESSARY TO BE OBSERVED IN THE ERECTION OF BUILDINGS IN GENERAL.

Sect. I. *Of the Principles necessary in erecting a Building.*

Having now finished our observations on the several detached articles necessary to complete the composition of different structures, we shall take some notice of the principles essential to the rearing of buildings in general.

The rules of building require, that in a whole fabric judiciously and elegantly erected, there should be solidity, convenience, and beauty; to which, according to the taste of some of the most refined masters, are added, order, disposition, proportion, decorum, and œconomy. These eight particulars are considered by the most skilful architects as absolutely requisite in the planning, erecting, and finishing an entire fabric.

Solidity implies the choice of a good foundation, proper materials to work with, as well as their judicious application. Convenience demands such a disposition of the various parts of a structure, that they may not crowd and embarrass each other, or appear disagreeable to a spectator. Beauty, of which we have treated in another place, is that engaging form, and pleasing appearance, which captivate at one

glance the eye of the observer Order gives each part of the building a proportionate extent; such as is adapted to the magnitude of the whole Disposition is the due ranging and agreeable union of all the parts, including a proper and convenient arrangement of the various apartments of the whole fabric Proportion is the relation that the whole work has to its constituent parts, and which each part has to the complete idea of the whole, for in buildings that are perfect in their kind, from any particular part we may form a tolerable judgment of the whole Decorum consists in making the whole aspect of the fabric so correct, that nothing shall appear, but what is founded on the principles of reason, geometry, and delicacy of judgment Design, in the limited sense here used, is the choice of one situation in preference to another, which we may conceive improper for the kind of building which we are about to erect The regard we have to the nature of places, from an inherent taste natural to mankind, makes us pitch upon different prospects or views for different parts of an edifice Œconomy instructs the architect to have regard to the expence of his whole design, which will be greatly effected by a choice of such materials as are not only proper for his purpose, but of the cheapest of the kind which are proper

Sect II *Of Proper and Sure Foundations*

The best foundation is that which consists of gravel or stone, but, in order to know whether the inferior strata are sufficient for the support of the building, it will be advisable to sink wells at some little distance By attending to what is thrown up in digging these, the architect will be acquainted with what lies under the stony or gravelly bed which on the surface promises so much security, and will know what measures to take

But though a stony or gravelly bottom is undoubtedly the most sure and firm, where all is sound beneath, there is no kind of ground which may prove more fallacious, or occasion such terrible accidents The reason of this is, that such kind of ground often contains absolute vacuities, nor is rock itself, though a foundation upon a rock is strong even to a proverb, free from danger of the same kind Caverns are very frequent in rocky places; and should an heavy building be erected over one of these, it might suddenly fall down altogether To guard against accidents of this kind, Palladio advises the throwing down great weights forcibly on the ground, and observing whether it sounds hollow, or shakes He says, if a drum be placed on the suspected ground near to a vessel filled with water, a gentle stroke will not resound nor ruffle the surface of the water, if the earth be solid; but, if it be hollow, the effects produced will very clearly shew it.

Where the foundation is gravel, it will be proper to examine the thickness of the stratum, and the qualities of those that lie under it, as they have appeared in digging If the bed of gravel is thick, and the under strata of a sound and firm kind, there needs no assistance, if otherwise we must have recourse to various methods in order to supply the defect.

In case of boggy earths, or unfirm sand, piling is one of the most common methods of securing a foundation; and, notwithstanding the natural disadvantages in such a case, piles, when properly executed, make one of the firmest and most secure foundations

In foundations near the edge of waters, we should always be careful to sound to the very bottom, as many fatal accidents have happened from the ground being undermined by rivers The same method is to be followed when the ground on which we build has been dug or wrought before It ought never to be trusted in the condition in which it is left, but we must dig through it into the solid and unmoved ground, and some way even into that, according to the weight and size of the intended edifice

Before the architect, however, begins to lay the foundation of the building, it will be proper to construct such drains as may be necessary for carrying off the rain, or other refuse water that would otherwise be collected and lodge about the house In forming drains for carrying off this water, it will be necessary to make large allowances for the different quantities that may be collected at different times It must also be considered, that water of this kind is always loaded with a vast quantity of sediment, which by continually falling to the bottom will be very apt to choak up the drain, especially at those places where there happen to be angles or corners in its course The only method of preventing this is by means of certain cavities disposed at proper distances from one another Into these the sediment will be collected, and they are for that reason called sesspools

All drains ought to be arched over at top, and may be most conveniently built of brick According to their different sizes, the following proportions of height and thickness may be observed If the drain is 18 inches wide, the height of the walls may be one foot, and their thickness 9 inches, the bottom may be paved with brick laid flat-ways, and the arch turned 4 inches If the drain be 22 inches wide, the side-walls are then to be one foot three inches in height, and the rest constructed as before. If it is 14 inches wide, the height of the walls may be 9 inches, and the sweep of the arch 4 A drain of a yard wide should have the same height, and the arch turned over it ought to be 9 inches thick Upon the same principles and proportions may other drains of any size be constructed

The sewers and drains being constructed in a manner proportioned to the size of the intended building, the architect may next proceed to lay the foundation of the walls Here his first care must be, that the floor of the foundation be perfectly smooth and level The Italians begin with laying over it an even covering of strong oak plank, and upon that they lay, with the most exact care, the first course of the materials Whether we take

this method, or begin upon the naked floor, all must be laid with the most exact truth by rule and line. When the board-plat is laid, a course of stone is the best first bed, and this is to be laid without mortar; for lime would make the wood decay, which otherwise, in a tolerably good soil, will last for ages

The thickness of foundation-walls in general ought to be double that of the walls which they are to support The looser the ground, the thicker the foundation-wall ought to be, and it will require the same addition also in proportion to what is to be raised upon it. The plane of the ground must be perfectly level, that the weight may press equally every-where for when it inclines more to one side than the other, the wall will split The foundations must diminish as they rise, but the perpendicular is to be exactly kept in the upper and lower parts of the wall, and this caution ought to be observed all the way up with the same strictness In some ground, the foundation may be arched, which will save materials and labour, at the same time that the superstructure has an equal security This practice is peculiarly serviceable where the foundation is piled

As the foundation-walls are to diminish in thickness, so are those also which are built upon them This is necessary in order to save expence, but is not absolutely so to strengthen the wall, for this would be no less strong though it was continued all the way to the top of an equal thickness, provided the perpendicular was exactly kept. In common houses built of brick, the general diminution from the bottom to the top is one half the thickness at the bottom, the beginning is two bricks, then a brick and a half, and lastly one brick in thickness In larger edifices, the walls must be made proportionally thicker, but the diminution is preserved much in the same manner When stones are used, regard must be had to their nature, and the propriety of their figures for holding one another, and where the wall is to be composed of different materials, as stone and brick, the heaviest ought always to be placed undermost

One farther particular respecting the strength of a plain wall must be observed, and that is, the fortifying its angles, This is best done with good stone on each side, which gives not only a great deal of strength, but a great deal of beauty. Pilasters properly applied afford great strength to walls Their best distance is about every 20 feet, and they should rise five or six inches from the naked of the wall The openings in a wall are all weakeners, and as the corners require to be the strongest parts, there should never be a window very near a corner Properly, there should always be the breadth of the opening firm to the corner

Along with the construction of walls, that of the chimneys must also be considered, for errors in the construction of these will render the most elegant buildings extremely disagreeable

After the walls are finished, the roof is the next consideration but concerning it very little can be said, only that its weight must be proportioned to the strength of the walls.

With regard to the floors they are most commonly made of wood, in which case, it will be necessary that it should be well seasoned by being kept a considerable time before it is used The floors of the same story should all be perfectly on a level, not even a threshold rising above the rest and if in any part there is a room or closet whose floor is not perfectly level, it ought not to be left so, but raised to an equality with the rest, what is wanting of the true floor being supplied by a false one

In mean houses, the floors may be made of clay, ox-blood, and a moderate portion of sharp sand These three ingredients, beaten thoroughly together and well spread, make a firm good floor, and of a beautiful colour In elegant houses, the floors of this kind are made of plaster of Paris, beated and sifted, and mixed with other ingredients This may be coloured to any hue by the addition of proper substances, and, when well worked and laid, makes a very beautiful floor Besides these, halls, and some other ground-rooms, are paved or floored with marble or stone, and this either plain or dotted, or of a variety of colours but the universal practice of carpeting has, in a great measure, set aside the bestowing any ornamental work upon floors See farther, the articles BEAM, BRIDGE, BUILDING, IRON-BRIDGE, &c

ARCHITHEORES, in antiquity, deputies appointed by the different towns and states of Greece, who represented them, and were sent to offer sacrifices in their name, on the great altar of the Olympian Jupiter Emulous to inspire strangers with high ideas of the riches and power of their different cities and countries, they endeavoured to excel each other in splendour Hence originated vases of gold and silver, gaudy robes, &c in the offices of their religion

ARCHITHOLUS (ἀρχιθολος, *from* ἀρχι, *the first*, and θολος, *a chamber*) The sudatorium, or principal room of the ancient baths

ARCHITRAVE, in architecture, that part of a column which lies immediately upon the capital, being the lowest member of the entablature Over a fire-place, this member is called the mantle-piece, and over doors or windows, the hyperthyron The architrave is different in the different orders

ARCHITRICLINUS, in antiquity, the director of a feast

ARCHITYPE, See ARCHETYPE

ARCHIVAULT, or ARCHIVALT, in architecture, the inner contour of an arch, or a band adorned with mouldings, running over the faces of the arch-stones, and bearing upon the imposts It has only a single face in the Tuscan order, two faces crowned in the Doric and Ionic, and the same mouldings as the architrave in the Corinthian and Composite

ARCHIVES (*archiva*, Lat) The places wherein records or ancient manuscripts are

preserved The word is applied, figuratively, to the records and manuscripts themselves

ARCHIVIST, a keeper of the archives In Greece and Rome this was deemed an office of great dignity, and was given to none but men of the first rank

ARCH LUTE, a theorbo, or large lute, the bass-strings of which are doubled with an octave, and the higher strings with a unison This instrument was formerly in such repute in most parts of Europe, that solos were frequently performed upon it in public It is still used in Italy, where it is called arcileuto

ARCHON, a Greek word which literally signifies a commander This word is applied by some authors to divers offices, both civil and religious, in the eastern or the Grecian empire But it is more generally confined to the chief magistrate of the city and commonwealth of Athens After the Athenians had abolished monarchy, they created archons who were obliged to render an account of their administration to the people These were at first chosen for life, and made hereditary but a perpetual magistracy seemed to this free people too lively an image of royalty, they therefore reduced the term of an archon's administration to ten years, and ere long to one year There were nine archons, one of whom called Polemarch was minister of war, but nothing more they were all debarred from commanding the armies of the republic Thus their charge was only an honorary function, so little calculated to excite the envy of the people, that they never aspired eagerly after this dignity, from which they were excluded by the laws of Solon M de Pauw after contrasting this office with that of consul, observes that "the principal magistrate of a democratic government should never go to the wars, but, considered as the living image of the law, he ought to reside constantly in the centre of the state When this is not the case, says he we may predict infallibly such a confusion of political and military subordination that he himself shall be incapable of discriminating between his duties as magistrate and as captain"

ARCHOPTO'MA (from αρχος *the anus* and πιπτω, *to fall down*) A procidence or prolapse of the anus Exania Proproctia

ARCHPHILO'SOPHER *s* (*arch* and *philosopher*) Chief philosopher (*Hooker*)

ARCHPRE'LATE *s* (*arch* and *prelate*) Chief prelate (*Hooker*)

ARCHPRIEST A priest established in some diocese, with a pre-eminence over the rest

ARCHTREASURER the great treasurer of the German empire This office was created with the eighth electorate, in favour of the elector palatine, who had lost his former electorate The dignity of archtreasurer was contested between the elector of Brunswick, who claimed it in virtue of his descent from the elector Frederic, and the elector palatine

A'RCHWISE *ad* (*arch* and *wise*) In the form of an arch (*Ayliffe*)

ARCTA'TION *s* (from *arcto*, Lat.) Confinement to a narrow compass

A'RCTIC *a* (from αρκτος) Northern; lying under the arctos, or bear

In astronomy, the arctic or north pole, is that which is raised above our horizon, and is nearly pointed out by the last star in the tail of Ursa minor The arctic circle is a less circle of the sphere parallel to the equator, and distant 23° 28′ from the north pole This and the antarctic are often called polar circles, and may be conceived to be described by the motion of the poles of the ecliptic round those of the equator

ARCTI'UM (*arctium*, αρκτιον, from αρκτος, *a bear*, so called from its roughness) In botany, burdock a genus of the class and order syngenesia polygamia æqualis Receptacle chaffy, calyx globular, the scales ending in an incurved hook, seeds crowned with chaffy bristles Two species, both natives of Europe A lappa, the common burdock of our own wastes, and a bardana, found throughout Europe generally, and supposed by some botanists to be a mere variety of the former Both are occasionally employed in medicine as diuretics and pectorals For which, see BARDANA

A'RCTOMYS Marmot In zoology, a genus of the class mammalia, order glires Fore teeth wedged, two in each jaw, grinders upper five in each jaw, lower four clavicles perfect This tribe of animals become torpid in the winter, ramble by day, feed on grain and roots, climb, burrow Head gibbous, rounded, ears short, or absent, body thick, tail short, hairy, fore feet four toed, with a very short thumb, hind-feet five toed, cæcum large Eleven species, chiefly inhabitants of the Alps and North America The two following are mostly worthy of notice

1 A Marmota Alpine marmot Ears short, round, body brown, beneath reddish Inhabits dry, open places on the summits of the Alps and Pyrennees, drinks little, basks in the sun and is easily tamed lives wild among small tribes, with a centinel placed to give notice of danger, which is done by a hiss, forms a burrow with many chambers and entrances for the summer, and another lined with soft grass in which it remains torpid during the winter

2 A bobac Bobac Ears small, oval, tail hairy, fore-thumb clawed, body grey, beneath yellowish Inhabits dry and sunny mountains in Asia, and especially China Habits similar to a marmot See Nat Hist pl XXIII

ARCTOPHYLAX, in astronomy, the same as Bootes

A'RCTOPUS In botany, a genus of the class and order polygamia diœcia Male umbels compound, involucres five-leaved, petals five, stamens five, pistils two, abortive Androgenous umbel simple, involucre four parted, spinous, containing numerous male-florets in the disk, and four females in the ray Male, petals five, stamens five Female, petals five,

styles two, seed one, two-celled, inferior The only known species is a Cape-plant that resembles the eryngium.

ARCTOTHE'CA In botany, a genus of the class and order syngenesia polygamia necessaria Receptacle cellular, chaffy, downless, calyx imbricate One species, a native of the Cape

ARCTOTIS In botany, a genus of the class and order syngenesia polygamia necessaria Receptacle villous or chaffy, seeds with a five leaved crown, calyx imbricate, the scales scarious at top Sixty-one species, all natives of the Cape They may be subdivided into those A with villous receptacles B with chaffy receptacles C doubtful The two species chiefly cultivated in our own greenhouses on account of their beauty are the a angustifolia, and a aspera the leaves of both which are highly elegant

ARCTU'RA (from *arcto*, to straiten) An inflammation of the finger or toe from a curvature of the nail

ARCTURUS, in astronomy, a fixed star, of the first magnitude, in the constellation of Bootes The word is formed of αρκτο, bear and ουρα, *tail*, q d bears tail, as being very near it This star was known to the ancients, as in the following verse of Virgil

Arcturum, pluviasque Hyades, geminosque Triones

See also Job ix 9 xxxviii 32

ARCTUS, in astronomy, the Greek name for the two constellations by the Latins called Ursa major and minor, and by us the greater and less Bear

ARCUA'LIA OSSA (from *arcus*, a bow) The bones of the sinciput, from their shape

ARCUA'LIS (from *arcus* a bow) The sutura coronalis from its bow like shape

ARCUATE Bowed Bent like a bow See BOWED

A'RCUATE *a* (*arcuatus*, Lat) Bent in form of an arch (*Bacon*)

ARCUA'TION *s* (from *arcuate*) 1 The act of bending any thing, incurvation 2 The state of being bent, curvity, or crookedness 3 [In gardening] The method of raising by layers such trees as cannot be raised from seed, by bending down to the ground the branches which spring from the offsets

ARCUA'TUS (from *arcus*, a bow) The jaundice from the supposed resemblance of the colour of the eyes in this disease to the rainbow

ARCUBA'LISTER *s* (from *arcus* and *balista*) A crossbow man (*Camden*)

ARD (Saxon) Signifies natural disposition as, Goddard, is a divine temper (*Gibson*)

ARDAMON, in antiquity, a vessel of water placed at the door of a person deceased, to intimate that some one was dead and not buried

A'RDEA. In zoology, a genus of the class and order aves grallæ. Bill straight, pointed, long, subcompressed, with a furrow from the nostrils towards the tip, nostrils linear, tongue sharp, feet four toed, cleft, toes connected at the base Ninety-six species, thus subdivided

A Crested bill scarcely longer than the head

B Cranes head bald

C Storks orbits naked

D Herons middle claw serrate inwardly

E Herons bill gaping in the middle

Every quarter of the globe furnishes some species We can only notice the following, for some of which, see Nat Hist pl LVII

1 A ciconia White stork Inhabits Europe Asia, and America three feet three inches long, feeds on fishes and reptiles, and is in some countries held sacred for its use in destroying serpents, sleeps on one leg, in autumn migrates in large and orderly flocks to the fens of Egypt and Barbary, greater wing-coverts black

2 A major Common heron, of which there are two varieties inhabits almost every where in fenny places, is very voracious, and preys on fishes and reptiles is a great depredator on fish-ponds, flies very high, with its head between its shoulders, and its legs pendulous, builds frequently in trees, and lays from four to five greenish blue eggs three feet three inches long

3 A virescens Green heron Of this there are four varieties, all beautiful Inhabits South America, eighteen inches long, sits on trees Bill greenish brown, a third part black, legs yellowish, crown deep green Male quill feathers gold-green, secondary rusty-edged Female crest hardly any, wing coverts with triangular rufous white spots at the tip

4 A stellaris Bittern Head smoothish, body above testaceous, with transverse spots, beneath paler, with long brown spots There are two species It inhabits the temperate parts of Europe, Asia, and both Americas, three feet two inches long, migrates northerly in summer, feeds on fishes and reptiles, about sun set rises in the air to a vast height in a spiral direction making a prodigious noise, builds among reeds, eggs from four to five, greenish ash

ARDEBIL, or ARDEBHIL, a town of Persia, in Asia It was the capital of Persia before Alexander the Great's time, and has been honoured with the residence of several of their kings, particularly Scheich Eider the founder of the Schah sect Lat 38 15 N, Lon 48 20 E

ARDEN, the common name of forests among the Celts, from the wildly extensive one which ranged for 500 miles in length across the country of Gaul or covered more than half the county of Warwick in Britain, and the sites of which still retain the appellation of Arden, to the much smaller one of the ancient Mancenion, that covered and surrounded the site of the present Manchester Ard signifies either high or great, and ven or den either a hill or wood Arduen, Ardven, or Arden, then, means a considerable wood

A'RDENCY. *s* (from *ardent*.) Ardour; eagerness; warmth of affection (*Boyle*).

ARDENNES, a department of France, being part of the late province of Champagne.

A'RDENT *a* (*ardens*, Lat. burning.) 1 Hot; burning, fiery (*Newton*) 2. Fierce, vehement (*Dryden*) 3 Passionate; affectionate (*Prior*)

ARDENT SPIRITS are distilled from fermented vegetables, and are thus called on account of their taking fire and burning such as brandy, spirit of wine, rum, arrack, &c

A'RDENTLY *ad* (from *ardent*) Eagerly, affectionately (*Sprat*)

ARDFERT, a city of Ireland, capital of the county of Kerry, with a bishop's see It once had a university Lat. 52 16 N Lon 9 40 W

ARDI'SIA In botany, a genus of the class and order pentandria monogynia Calyx five-leaved, corol salver-shaped, with the border reflected, anthers large, erect, stigma simple; drupe superior, one-seeded Nine species, chiefly natives of the West India islands Of these the a humilis, which, however, is a native of Ceylon, with thick, shining, alternate, evergreen leaves, and red flowers, is the most elegant

A'RDOUR *s* (*ardor*, Lat heat) 1 Heat 2 Heat of affection, as love, desire, courage (*South*) 3 The person ardent or bright (*Milton*)

ARDRA, or ARDER, a kingdom of Africa, on the Slave coast, the country is represented as extensive, populous, and fertile, but not much known It is situated on the east side of the Volta

ARDRE, a river of France, which joins the Loire at Nantes

ARDRES, a town of France, in the department of the Straits of Calais, and chief place of a canton, in the district of Calais It was taken by the Spaniards, in 1596, and restored two years after at the peace of Vervins Between Ardres and Guines, was the celebrated meeting of Henry VIII of England with Francis I king of France, in 1520 two posts SE Calais, and three NW of St Omer

ARDUI'NA Bastard lycium a genus of the class and order pentandria monogynia Corol one-petalled, stigma bifid, berry two-celled, seeds solitary The only known species is a native of the Cape, shrub-branched, with perennial leaves, flowers terminal and clustered; and bright red berries

ARDU'ITY *s* (from *arduous*) Height, difficulty

A'RDUOUS. *a*. (*arduus*, Lat) 1 Lofty, hard to climb (*Pope*) 2 Difficult (*South*)

A'RDUOUSNESS. *s*. (from *arduous*) Height, difficulty

ARE. The third person plural of the present tense of the verb *to be*

AREA, in architecture, the space or site of ground on which an edifice stands It is also used for inner courts

AREA, in geometry, denotes the superficial content of any figure Thus, if a figure, e g. a field, be in the form of a square, and its side be 40 feet long, its area is said to be 1600 square feet; or it contains 1600 little squares, each a foot every way The business of finding areas is generally called Mensuration of Superficies: it is well treated, both in theory and practice, in Dr Hutton's Mensuration

AREA, is also applied to any open surface, as the area before a house

To ARE'AD *v. a.* (aræðan, Sax to counsel.) To advise, to direct (*Milton*)

A'RECA Areca-nut fansel-nut a genus of the class and order monœcia polyandria Spathe two-valved; corol three-petalled Male filaments nine, the three outer ones longer Fem drupe with an imbricate calyx Three species the a catechu, and a oryzæformis of India, and the a oleracea of the West Indies They are all lofty and elegant trees, shooting up as straight as an arrow, and beautifully arching their branches towards the soil The a catechu was so denominated from a belief that the extract of its nut was the officinal catechu or terra Japonica, but this is a mistake (See CATECHU) The a oryzæformis, or rice-shaped, bears a fruit used for chewing by the inhabitants of Cochin-China and Amboyna, along with the betel-leaf The a oleracea is almost the crown of the vegetable world It is the tallest and one of the most beautiful trees known to the naturalist, and every part of it is useful Its trunk is perfectly straight, about seven feet in circumference near the ground, tapering as it ascends, and often reaching the height of a hundred and seventy or two hundred feet Its numerous branches shoot forth at about five feet high from the ground in a circular direction, the lowermost spreading horizontally with the utmost regularity, while the extremes of many of the higher branches bend wavingly downwards, like so many plumes of feathers These when full grown are often more than twenty feet long The pithy interior part of the leaf is filamentous, and used like hemp or flax, for cordage of every kind The fruit is the widely celebrated cabbage, lying towards the top of the trunk, under the leaves in thin snow-white, brittle flakes, sweeter in taste than the almond, but strongly resembling it The sockets or grooves formed by the footstalks of the branches are used by the natives as cradles for their children On the inner side of the younger footstalks are tender pellicles which serve the purpose of the papyrus, and are converted into paper. The trunk serves as gutterings the pith produces a kind of sago, and the nuts yield oil by decoction.

AREFA'CTION *s*. (*arefacio*, Lat) The state of growing dry; the act of drying (*Bacon*)

To A'REFY *v n* (*arefacio*, Lat) To dry; to exhaust of moisture (*Bacon*)

AREMBERG, a town of Westphalia, in Germany It is the capital of a county of the same name. Lat 50 22 N Lon 7 3 E

ARENA, in architecture, the middle or body of a temple

Arena, the lowest part of an amphitheatre

ARENA'CEOUS *a* (*arena*, Lat) Sandy, having the qualities of sand (*Woodward*)

ARENA'RIA Sandwort sea-chickweed a genus of the class and order decandria trigynia Calyx five-leafed, spreading, petals five, entire, capsule superior, one-celled, many-seeded Thirty-six species, chiefly European, and many of them common to most countries of Europe (see Botany, pl V) Those most frequently met with in our own country are a peploides on the sea-coast, a trinervia in the woods, a serpillyfolia on old walls, a rubra in sandy fields, a maritima on the sea-coast, a verna on the mountains, a tenuifolia in sandy plains

ARENARII, in antiquity, slaves of the lowest rank who, as gladiators, fought with beasts in the arena

ARENO'SE *a* (from *arena*, Lat) Sandy, full of sand

ARENSBERG, a town of Westphalia, in Germany Lat 51 25 N Lon 8 20 E

Arensberg, an episcopal and sea-port town of Livonia, in Sweden Lat 58 15 N Lon 25 40 E

ARE'NULOUS *a* (from *arenula*, Lat) Full of small sand, gravelly

ARE'OLA (*areola*, dim of *area*, a void space) A small brown circle, which surrounds the nipples of females

AREOMETER See Aræometer

AREOMETRY See Aræometry

AREOPAGUS, or Aræopagus, a sovereign tribunal at Athens, famous for the justice and impartiality of its decrees, to which the gods themselves are said to have submitted their differences. It was in the town, on a rock or hill opposite to the citadel The word signifies strictly, rock of Mars, from παγος, hill, and αρειος, belonging to Mars Mr Spon, when at Athens, found some remains of the areopagus still existing in the middle of the temple of Theseus, which was heretofore in the middle of the city, but is now without the walls The foundation of the areopagus is a semicircle, with an esplanade of 140 paces round it, which properly made the hall of the areopagus There is a tribunal cut in the middle of a rock, with seats on each side of it, where the areopagites sat, exposed to the open air

The areopagus when originally constituted was nothing more than a simple criminal tribunal, intended particularly to judge murderers and incendiaries, without possessing the smallest influence on the civil government of the republic But Solon, guided by motives which cannot now be explained, invested the areopagus with the vague powers of a directing senate, for the general inspection of the state, and preservation of the laws In consequence of this, the areopagites had a continual tendency to acquire authority in every department of the state, yet they could never obtain the direction of religious matters, or any influence in theological contests It has been commonly asserted that judgments were always given in the areopagus by night but this is certainly erroneous, for at Athens, as well as Rome, no sentence could be passed while the sun was under the horizon It is also false, that orators in the presence of the areopagites were restrained from employing exordiums, perorations, and all the great springs of an eloquence generally exerted to produce either terror or pity Antiphon, pleading before their tribunal concerning the murder of Herod, introduced, not only an exordium, but the longest peroration ever known Indeed, two distinct crimes could not be confounded before this tribunal and when any man had been arraigned for homicide, it was illegal to accuse him, at the same time, of theft or sacrilege This was not only proper, but necessary, for the areopagus had not the power of judging the two last of these crimes, which appertained exclusively to another court The suffrages of these judges were long kept secret, from motives of personal security as well as propriety The areopagites were obliged, in all cases, to hear a tetralogy, or four pleadings, two of which were for the prosecution, and as many in favour of the accused It is only necessary to read the tetralogies of Antiphon, to be convinced that they contained all the subtleties of which the human mind is susceptible The number of persons who composed the areopagus varied from circumstances At first the number was nine An annual addition of nine new members always took place, because those who had been archons were entitled to a place there, after their year of magistracy had expired the assembly consisted in general of between three and four hundred persons They were judges for life According to the institutes of Solon, this court should have been composed alone of nobles, or such as were of the equestrian order, but when a real democracy was established, the plebeians likewise enjoyed the same privilege whenever they had been archons De Pauw on the Greeks, § 6

As this assembly exhibited the greatest firmness in punishing crimes, and the nicest circumspection in reforming manners, as it never employed chastisement till advice and menaces were slighted, it acquired the esteem and confidence of the people, even whilst it exercised the most absolute power Its meetings were held three times in every month, viz on the 27th, 28th, and 29th days, but on any urgent business, the senators assembled in the royal portico The court was divided into several committees, each of which took cognizance of separate causes, if the multiplicity of business would not allow time for them to be brought before the whole senate and this was done by lots, that the causes might not be prejudged In crimes that concerned religion or the state, the power of this court was limited to preparing the matter for a trial, and it then made its report to the people, without coming to any conclusion The accused then had it in his power to offer new pleas in his defence, and the people named orators to conduct the prose-

cution before one of the superior courts Trials in the areopagus were preceded by tremendous ceremonies. The two parties, placed amidst the bleeding members of the victims, took an oath, which they confirmed by dreadful imprecations against themselves and families They called to witness the Eumenides who, from a neighbouring temple, dedicated to their worship, seemed to listen to the invocation, and prepare to punish the perjured They then proceeded to the trial, though not, as has been commonly affirmed, without allowing exordium, epilogue, or appeal to the passions After the question had been sufficiently discussed, the judges silently deposited their suffrages in two urns, one of brass, called the urn of death, and the other of wood, called the urn of mercy This mode of giving votes was afterwards abandoned, and they were delivered in public, by casting their calculi or flints upon two tables, one for those that were acquitted, and the other for those condemned when the numbers were equal, an inferior officer added, in favour of the accused, the suffrage of Minerva, so called, because, according to an ancient tradition, this goddess being present in the court of areopagus at the trial of Orestes, gave her casting vote to turn the scale of justice (*British Encycl*)

ARFOTICK *a.* (αρωστικα) In medicine, efficacious in opening the pores attenuant

AREQUIPA, a city of Peru, in South America There is a volcano in its neighbourhood Lat 16 40 S Lon 75 30 W

ARETHUSA The most celebrated of this name was a nymph of Elis daughter of Oceanus, and one of Diana s attendants As she returned one day from hunting, she sat near the Alpheus, and bathed in the stream The god of the river was enamoured of her, and he pursued her over the mountains and all the country, when Arethusa, ready to sink under fatigue, implored Diana, who changed her into a fountain The Alpheus immediately mingled his streams with hers, and Diana opened a secret passage under the earth and under the sea, where the waters of Arethusa disappeared, and rose in the island of Ortygia near Syracuse, in Sicily. The river Alpheus followed her also under the sea, and rose also in Ortygia, so that, as mythologists relate, whatever is thrown into the Alpheus, in Elis, rises again, after some time, in the fountain Arethusa, near Syracuse

ARETHU'SA. In botany, a genus of the class and order gynandria diandria. Nectary one-leafed, tubular, within the bottom of the corol; the lower lip united to the styles Seven species, all natives of North America or the Cape.

ARETIA. In botany, a genus of the class and order pentandria monogynia. Corol salver-shaped, five cleft, with an ovate tube, stigma a depressed head, capsule one-celled, globular, mostly five-seeded. Four species, all of Switzerland or the Alps, some with blue, others with yellow flowers.

ARETIN, or ARETINO (Guido), an Italian musician, was a benedictine monk in the 11th century. He published a treatise on music, entitled Micrologus, and a letter printed by Baronius in his Annals, under the year 1022

He introduced a reformation of the Greek system He, indeed, appears to have been the first who discovered its incompatibility with harmony, or who had any true idea of the combination of sounds He added a note below the proslambanomenos, or lowest note, which he called Gamma, and so arranged the scale as to serve better the great purposes of harmony as well as of melody, by dividing it into hexachords, to the notes of which he applied the six monosyllables, ut, re, mi, fa, sol, la, taken from a Latin hymn, written in honour of John the Baptist Guido also improved the ancient manner of writing music The method had been to place all the notes upon one line and to distinguish them from each other by the letters of the alphabet, but he substituted certain points, which he disposed upon and between four lines, and afterwards five, and from these points we derive the term counterpoint The harmony introduced by Guido was as simple as possible, consisting only of the fundamental note its third, fifth and octave These and other improvements of this original theorist, extending themselves by degrees from Italy into the other Christian countries of Europe, were received by the whole church, while ingenious imitators arising from day to day, and still improving upon their inventive master, enlarged the bounds both of melody and harmony, and freed them from the narrow limits of the ancient Greeks and Romans (*Busby*)

The history of Guido s invention of solmisation being somewhat curious, it is here added

In his retirement he seems to have devoted himself to the study of music, particularly the system of the ancients, and, above all, to reform their method of notation The difficulty that attended the instruction of youth in the church offices were so great, that, as he himself says, ten years were generally consumed barely in acquiring the knowledge of the plain song, and this consideration induced him to labour after some amendment, some method that might facilitate instruction, and enable those employed in the choral office to perform the duties of it in a correct and decent manner If we may credit those legendary accounts that are extent in old monkish manuscripts we should believe he was assisted in his pious intention by immediate communications from heaven, some speak of the invention of the syllables as the effect of inspiration, and Guido himself seems to have been of the same opinion, by his saying it was revealed to him by the Lord; or, as some interpret his words, in a dream: but graver historians say, that being at vespers in the chapel of his monastery, it happened that one of the offices appointed for that day was the hymn to St John

UT queant laxis REsonare fibris
MIra gestorum FAmuli tuorum
SOLve polluti LAbii reatum,
Sancte Joannes

During the performance of the hymn, he remarked the iteration of the words, and the frequent returns of ut, re, mi, fa, sol, la he observed likewise a dissimilarity between the closeness of the syllable mi, and the broad open sound of fa, which he thought could not fail to impress upon the mind a lasting idea of their congruity, and immediately conceived a thought of applying the six syllables to perfect an improvement either then actually made by him, or under consideration, viz that of converting the ancient tetrachords into hexachords

Struck with the discovery he retired to his study and having perfected his system, began to introduce it into practice the persons to whom he communicated it were the brethren of his own monastery, from whom it met with but a cold reception, which in the epistle to his friend, he ascribes undoubtedly to its true cause, envy however, his interest with the abbot, and his employment in the chapel, gave him an opportunity of trying the efficacy of his method on the boys who were training up for the choral service, and it exceeded the most sanguine expectation "To the admiration of all (says cardinal Baronius), a boy thereby learnt, in a few months, what no man, though of great ingenuity, could before that attain in several years

The fame of Guido's invention soon spread abroad, and his method of instruction was adopted by the clergy of other countries we are told by Kircher, that Hermanus bishop of Hamburg, and Elvricus bishop of Osnaburg made use of it, and by the authors of the Histoire Litéraire de la France, that it was received in that country, and taught in all the monasteries in the kingdom It is certain that the reputation of his great skill in music had excited in the pope a desire to see and converse with him, of which, and of his going to Rome for that purpose, and the reception he met with from the pontiff, he himself has given a circumstantial account

ARETOLOGY, that part of moral philosophy which treats of virtue, and the means of arriving at it

AREZZO, an ancient town of Florence, in Italy, seated on a mountain Lat 43 27 N Lon 12 0 E

ARGAL, or ARGOL, the tartar adhering to the sides of the teeth

ARGALI See OVIS

ARGEA, in Roman antiquity, thirty human figures, made of rushes, thrown annually by the priests or by the vestals into the Tiber, on the day of the Ides of May Different reasons are assigned for this ceremony

ARGEMONE. Prickly poppy a genus of the class and order polyandria monogynia Calyx three leaved, petals six, capsule half-valved Three species, Mexico, Armenia, Pyrenees

ARGENT, the common French word for silver, of which metal all white fields or charges are supposed to consist Argent of itself is used in heraldry to signify purity, innocence, beauty, and gentleness

ARGENTAL MERCURY, a native amalgam of silver, by which name it was formerly known It received its present appellation from C Hauy, whose experiments have made us acquainted with many of its properties from its great rarity, however, it is as yet but imperfectly known, scarcely any person besides having examined it with much attention This mineral is found in the mines of Hungary, and, when separated from its ore, has the colour and resplendence of silver or polished tin, or rather more frequently of liquid mercury, because it generally retains at its surface a thin stratum of that metal Its crystals are dodecaedral-rhomboidal, in various modifications Its specific gravity is 14 1192, being considerably greater than that of either of the two metals of which it is composed This substance has been carefully analysed by C Cordier, engineer of mines in France, and found to contain 72 5 parts of mercury to 27 5 of silver it appears also to be a real chemical combination of the two metals, and not a paste-like mixture, from which circumstance the propriety of its present name instead of the former one of an amalgam, is obvious See the Philosophical Magazine, vol xiv p 41, or Journal des Mines No 67

ARGENTINE FLOWERS OF ANTIMONY See ANTIMONY

ARGENTARIUS, in antiquity, a money-changer or banker

ARGENTEUIL, a town of the isle of France Lat 48 52 N Lon 2 22 E

ARGENTEUIL, a town of France, in the department of the Yonne, three leagues from Tonnerre

ARGENTICOMUS, among astrologers, a silver haired comet, from the appearance of which great changes in our system are predicted

ARGENTINA Argentine In zoology, a genus of the class and order pisces abdominalia Teeth in the jaws and tongue gill membrane with eight rays, vent near the tail, ventral fins of many rays Four species, two inhabitants of the Red sea, one Mediterranean, one fresh waters of Carolina A sphyræna is the European argentine Anal fin with nine rays inhabits the Mediterranean, and sometimes wanders to the British coasts from two to four inches long body round, tapering, back and sides, as far as the lateral line, pale ash mixed with green, below the line and belly fine silvery air-bladder conic both sides, appearing as if covered with silver leaf, and is used in the manufacture of artificial pearls

ARGENTINE See ARGENTINA

ARGENTIERRA, an island near that of Milo, in the Archipelago It receives its name from the silver mines found in it Lat 36 50 N Lon 23 10 E.

ARGENTON, a town of France, in the department of Indre Lat 46 35 N Lon 1 38 E

ARGENTUM Silver Of a whitish colour not tarnished by the air, hard and tenacious, sonorous, exceedingly malleable, and ductile, specific gravity before hammering 10·478 melting when perfectly red hot, and its brilliancy much increased Soluble in nitric acid, giving no colour to the solution, and capable of being precipitated from it by copper, iron, or zinc. Thirteen species We shall enumerate a few

1 A nativum Native, or capillary silver Found in various parts of Great Britain, particularly in the copper mines of Cornwall, in the mines of Mexico and Peru, and in most of the mines on the continent Rarely to be met with quite pure, but most commonly combined with a greater or less proportion of copper, and has sometimes its surface striate assumes various forms, and is occasionally found in prisms or cubes In malleability it yields only to gold, as it may be beaten out into leaves the 160,000th part of an inch thick, and may be drawn out to so fine a wire that a single grain can be extended nearly 400 feet in length Its tenacity is likewise such that a wire 0 078 of an inch in diameter will support 17,813 pounds without breaking When melted, if the heat be increased, the liquid metal boils, and will at last be volatilized When dissolved in nitric acid and precipitated in lime water, it falls to the bottom in the form of a dark greenish-brown powder When dissolved in nitric acid and precipitated with mercury, it shoots up in a shrub-like form, and is then called arbor dianæ Its solution is colourless, highly caustic, giving the hair, skin, and almost all animal substances, an indelible black colour, and when evaporated till a pellicle begins to form on its surface, it deposits on cooling transparent crystals of nitrat of silver (see ARGENTUM NITRATUM) If its precipitate by lime water be dried and washed with a solution of pure ammonia, it has a most dangerous fulminating property, exploding most violently on the slightest touch or friction This powder is denominated fulminating powder, or pulvis fulminans

2 A nigrum Black silver Black silver ore Found in the silver mines of Sicily, Britanny, Saxony, Hungary, and Bohemia, sometimes covering other minerals as with a coating, sometimes interspersed in larger or less particles, or in a pulverised state commonly combined with sulphur, arsenic, copper, or a little iron

3 A. corneum Corneous silver corneous silver-ore Muriat of silver· the last name from its containing a considerable portion of muriatic acid. Found in the mines of Mexico, Peru, Siberia, Hungary, Bohemia, Saxony, and Germany It melts before a candle like wax or suet; and before the blow-pipe leaves small grains of pure silver Soft and easily cut with a knife. Colour white, grey, yellowish, greenish yellow, or brown

4 A. electrum Auriferous silver. Found in the mountain Schlangenburg in Siberia, and in the mines Kongsburg in Norway, of a pale brass colour sometimes containing 28 of gold and 72 silver in the 100

5 A, stibiatum Antimonial silver ore, or antimonial native silver Found near Wittichen in the district of Turstenburg

6 A vitreum Vitreous silver, sulphuret of silver sulphurated silver ore Found in the mines of Siberia, Norway, Saxony, Bohemia, Hungary, Spain, and America, generally superficial, and running like veins through other fossils It is one of the richest ores of silver, usually containing 85 per cent. of pure silver

7 A rubrum Ruby silver ore There are two varieties, light red silver ore and dark red silver ore Found in various mines of Peru, Chili, France, Spain, Germany, Saxony, Hungary, &c with arsenic, galena, or other ores of silver, Contains silver 56, antimony 16, sulphur 15, oxygen 12, and a little arsenic

ARGENTUM ALBUM, in our old customs, silver coin, or pieces of bullion that passed for money

ARGENTUM DEI, anciently signified earnest money, or that given to bind a bargain

ARGENTUM FULMINANS, or FULMINATING SILVER, which see, as also ARGENTUM

ARGENTUM MOSAICUM, or MUSIVUM, a metallic alloy in the form of silvery flakes, used for the colouring of plaster figures, and for other purposes, as a pigment It is formed of equal parts of tin, bismuth, and mercury, and may therefore be called a compound amalgam When used, it is mixed with white of eggs, or spirit varnish, and then applied to the proposed work, which is afterwards to be burnished

ARGENTUM NITRATUM Causticum lunare Lunar caustic This preparation of silver is called nitras argenti fusus in the new chemical nomenclature Its virtues are corrosive and adstringent Internally it is exhibited in very small quantities in epilepsy, and externally it is employed to destroy fungous excrescences, callous ulcers, fistulas, &c In the latter disease it is injected in the quantity of from two grains to three dissolved in an ounce of water

ARGENTUM VIVUM See HYDRARGYRUS

ARGESTES, is used by Vitruvius for the wind which blows from that quarter of the horizon, which is 75 deg from the south, and westward Ricciolus uses the term to denote the wind which blows at 22 deg 30 min from the west towards the north, coinciding with that which is otherwise called West-North-West

ARGETENAR, a small fixed star in Eridanus

ARGIL See CLAY and ARGILLA Native argil, or lac luna, is a mineral of a snow-white or yellowish white colour It is found in kidney-form masses of various sizes It is opaque when dry, but when soaked in water, semitransparent It is often found mixed

with a small proportion of carbonat of lime, and sometimes a slight quantity of iron and silex Mineral acids dissolve it This mineral is chiefly, if not exclusively, brought from Halle, in Saxony Its specific gravity, according to Bergman, is 1 305, to Gmelin 1 609

ARGI'LLA Argil A genus of the class earths, order argillaceous consisting of alumina and silica with generally some oxyd of iron and inflammable matter, opake, without lustre, of a common form, soft to the touch, earthy, lightish, imbibing and retaining water, and oil, by each of which it is softened, and rendered plastic by the former, and emitting an earthy smell not effervescing with nitric acid, contracting and becoming harder in the fire Thirty species the following the chief

1 A porcellana Porcelain earth or clay It is found loose, in a compact form, in a powdery form, and mixed with micaceous particles Cornwall, Japan, China, Saxony, and various parts of Europe, and is supposed to originate from decomposed feldspar It is principally used in the manufacture of China ware Contains alumina 60, silica 20, air and water 12

2 A leucargilla Pipe-clay, potters-clay common clay Found very generally in Europe, especially in Normandy, near Cologne, and in Livonia Colour varying from pure white to black, often variegated When first exposed to heat it becomes blackish from the inflammable matter it often contains, but by continued heat it turns pure white It is used for tobacco pipes and various vessels

3 A lithomarga Lithomarge potter's clay of Thomson Several varieties Found in various parts of the world in clay and limestone rocks, in long layers between clay and limestone, sometimes compact, sometimes in the form of powder of various colours alters its colour by fire, becomes very hard, and by continued heat melts into a red porous clay It is entirely diffusible by water, and when duly moistened very ductile, on which account it is highly useful in potteries and China-manufactories

4 A fullonica Fullers earth Found in Britain, Sweden, Saxony, and Portugal brown or grey, with generally a shade of green, rarely flesh colour Receives a polish from friction, does not adhere to the tongue, feels greasy From the great avidity with which it absorbs oil, it is used by fullers to take grease out of cloth

5 A lemnia. Lemnian earth Found chiefly in the isle of Lemnos and in Silesia Formerly used as a bole in medicine

6 A. communis. Common clay Several varieties Found in almost every part of the globe, frequently forming vast strata below the surface, and often bearing the impressions of vegetables Colour blueish and yellowish grey, smoke-colour, dull blueish, rarely green or flesh-colour, and impregnated with a greater or less degree of silica

7 A cimolia Cimolite Found in the isle of Argentiera in the Archipelago, where it is used for whitening stuffs Pearl-grey colour, becoming white before the blow-pipe.

8 A rubrica. Reddle Found in Siberia, Dalecarlia, Bohemia, Portugal, and France, generally among iron ore, with which it commonly abounds Colour dark cochineal red, or intermediate between brick and blood red

9 A lutea Yellow ochre Found near Wetran Feels smooth or somewhat greasy Contains alumina 60, oxyd of iron 40, water acidulated by sulphuric acid 10

10 A arvensis Field-clay Loam Cinereous, forming small clods when moistened, splitting into large clefts while drying, and becoming at last powdery, vitrifying in the fire Found every where in cultivated lands

ARGILLA'CEOUS *a* (from *argil*) Clayey, consisting of argil, or potters' clay

ARGILLACEOUS EARTHS An order containing principally aluminous earths See ALUMINE and ORYCTOLOGY

ARGI'LLOUS *a* (from *argil*) Consisting of clay, clayish, containing clay (*Brown*)

ARGNES (Gerard d'), a French mathematician, was born at Lyons, in 1597, and died there in 1661 He was the friend of Descartes, whom he defended with great spirit He wrote a treatise on Perspective, of Conic Sections, the Practice of Drawing, and a treatise on Stonecutting

ARGO, in antiquity, a ship or vessel celebrated among the poets, being that wherein the argonauts, of whom Jason was the chief, made their expedition in quest of the golden fleece Sir Isaac Newton thinks that this expedition was really an embassy sent by the Greeks, during the intestine divisions of Egypt, in the reign of Amenophis, to persuade the nations upon the coasts of the Euxine and Mediterranean seas to take that opportunity of shaking off the yoke of Egypt, which Sesostris had laid upon them and that fetching the golden fleece was only a pretence to cover their true design

ARGOL, or ARGAL, in chemistry, the same as tartar

ARGOLIS, so called from an ancient prince whose name was Argos, one of the six districts of Peloponnesus, situated on the north-east side, was bounded by Achaia on the north, Arcadia on the west, Laconia and the Argolic gulf on the south, and the Ægean sea on the east. This province is peculiarly interesting to the Grecian antiquarian and historian, because it was the cradle of the Greeks, since it first received the foreign colonies by whom they were civilized

ARGONA'UTA In zoology, a genus of the class and order vermes testacea Animal a sepia or clio shell univalve, spiral, involute, membranaceous, one celled Five species The following is well entitled to notice.

A argo, Nautilus Keel or ridge of the shell slightly toothed on each side Inhabits the Mediterranean and Indian ocean, and was supposed in former ages to have taught mankind the first use of sails When it means to sail, it discharges a quantity of water, by

which it was made heavier than the sea-water, and rising to the surface erects its arms, and throws out a membrane between them; by which contrivance it is driven forwards like a vessel under sail, hanging two of its arms over the shell, to serve as oars or as a rudder. The nautilus in the Linnean system is an animal somewhat different from the argonauta, for which, see NAUTILUS.

ARGONAUTIC, something relating to the argonauts. The argonautic expedition is one of the greatest epochas which sir Isaac Newton endeavours to settle, and from thence to rectify the ancient chronology. This he shews, by several authorities, to have been one generation, or about thirty years earlier than the taking of Troy, and forty-three years later than the death of Solomon.

ARGONAUTS, in antiquity, a company of fifty-one, according to Valerius Flaccus, or according to Apollonius Rhodius, forty-four heroes, who embarked along with Jason in the ship Argo for Colchis, with a design to obtain the golden fleece.

ARGO NAVIS, in astronomy, the Ship Argo, a southern constellation, containing 48 stars in the following order, 1 6 11 13 14 3.

ARGOPHYLLUM. In botany, a genus of the class and order pentandria monogynia. Calyx five cleft, superior, corol five petalled, nectary pyramidal, five-angled, as long as the corol, capsule three-celled, many-seeded. The only known species is a native of New Caledonia.

ARGOS, a seaport of Turkey in Europe, in the Morea, 2[?] miles S of Corinth. Lat 37 30 N. Lon 2[?] 5 E.

A'RGOSY. s (from *Argo*, the name of Jason's ship.) A large vessel for merchandise, a carrack (*Shakspeare*).

To ARGUE. *v n* (*arguo*, Latin.) 1. To reason, to offer reasons (*Locke*). 2. To persuade by argument (*Congreve*). 3. To dispute (*Locke*).

To A'RGUE. *v a* 1. To prove any thing by argument (*Donne*). 2. To debate any question. 3. To prove, as an argument (*Milton*). 4. To charge with, as a crime (*Dry.*).

A'RGUER. *s* (from *argue*.) A reasoner, a disputer; a controvertist (*Atterbury*).

ARGUIN, an island of Africa, on the western coast of Negroland. The Dutch took this place from the Portuguese in 1638, and the French took it from the Dutch. Lat 20 30 N. Lon 17 20 W.

A'RGUMENT. *s* (*argumentum*, Lat.) 1. A reason alleged for or against any thing (*Locke*). 2. The subject of any discourse or writing (*Milton. Sprat*). 3. The contents of any work summed up by way of abstract (*Dryden*). 4. Controversy (*Locke*).

ARGUMENT, in astronomy, is used to denote any known arch or quantity, by which another required arch or quantity may be found. For example, the argument of that part of the equation of time which arises from the unequal angular motion of the earth in its orbit, is the sun's anomaly, because that part of the equation depends entirely upon the anomaly. Again, the argument of the moon's or a planet's latitude is its distance from its node, because upon this the latitude depends.

ARGUMENT, in rhetoric, is some reason, or series of reasoning, by which we establish the proof, or shew the probability, of some given proposition.

Logicians, somewhat more scientifically, define argument, a medium, from whose connection with two extremes, the connection of the two extremes themselves is inferred.

Arguments are termed grammatical, logical, physical, metaphysical, moral, mechanical, theological, &c. according to the art, science, or subject, from whence the middle term is borrowed. Thus, if we prove that no man should steal from his neighbour, because the scripture forbids it, this is a theological argument: if we prove it from the law of the land, it is political: but if we prove it from the principles of reason and equity, the argument is moral. Arguments are either certain and evident, or doubtful and merely probable. Probable arguments are those whose conclusions are proved from some probable medium. Evident and certain arguments, are those which prove their conclusions by clear media and undoubted principles: these are called demonstrations. In reasoning, Mr Locke observes, that men ordinarily use four sorts of arguments. The first is to allege the opinions of men, whose parts and learning, eminency, power, or some other cause, have gained a name, and settled their reputation in the common esteem, with some kind of authority: this may be called *argumentum ad verecundiam*. Secondly, another way is to require the adversaries to admit what is alleged, as a proof, or to assign a better: this he calls *argumentum ad ignorantiam*. A third way, is to press a man with consequences drawn from his own principles or concessions: this is known by the name of *argumentum ad hominem*. Fourthly, the using proofs drawn from any of the foundations of knowledge or probability: this he calls *argumentum ad judicium*, and observes, that it is the only one of all four, that brings true instruction with it, and advances us in our way to knowledge.

ARGUME'NTAL. *a* (from *argument*.) Belonging to argument, reasoning (*Pope*).

ARGUMENTA'TION. *s* (from *argument*.) Reasoning, the act of reasoning (*Watts*).

ARGUME'NTATIVE. *a* (from *argument*.) Consisting of argument, containing argument (*Atterbury*).

ARGUMENTUM AD HOMINEM. See ARGUMENT.

ARGUS, in fabulous history, the son of Aristor, was said to have had a hundred eyes, fifty of which were always open. Juno made choice of him to guard Io, whom she had transformed into a white heifer, but Jupiter pitying Io, for being so closely confined, sent Mercury, who, with his flute, charmed Argus to sleep, sealed up his eyes with his cadu-

ceus, and cut off his head Juno, to reward his fidelity, turned him into a peacock, and placed his eyes in the tail

ARGUS is also the name of a very curious shell, about three inches long, two in diameter, and somewhat less in height. It is covered with a multitude of round spots, like eyes, from whence it has its name It is brought from Africa and the East Indies

A'RGUTE *a* (*arguto*, Ital *argutus*, Lat.) 1 Subtile, witty, sharp 2 Shrill

ARGUTIÆ, witty and acute sayings, which commonly signify something further than what their mere words at first sight seem to import —Writers on rhetoric speak of divers species of argutiæ, which are of too little consequence to require a particular enumeration

ARGYLLSHIRE, a county of Scotland, bounded on the N by Inverness shire, on the E by the counties of Perth and Dumbarton, on the S and W by the Atlantic ocean, by which it is broken into islands and peninsulas It is not quite 100 miles long from the Mull of Cantyre to its N E extremity its breadth is unequal, about 30 miles where greatest It contains more than 71,000 inhabitants

ARGYRASPIDES or ARGYROASPIDES, in antiquity, persons armed with silver bucklers, or bucklers silvered The argyraspides, according to Quintus Curtius, made the second corps of Alexander's army the first was the phalanx

ARGYRITÆ AGONES, in antiquity, games in which money was the prize

ARGYTHA'MNIA In botany, a genus of the class and order monœcia tetrandria Male calyx four-leaved, petals four Female calyx five leaved, corolless, styles three, forked, capsule three celled, seeds solitary The only known species is a native shrub of Jamaica

ARIA DI BRAVURA, in music or as it is familiarly called, a Bravura, is a melody at once florid, rapid, and energetic Its divisions are volatile, and the passages every-where bold and heroic The execution of this species of air is generally confined to soprano voices, and it is only to powers of the first order that we can look for its just performance

ARIA FUGATA (Ital) Fugued air An elaborate species of melody much used in the last age and frequently found in the operas of Handel, Bononcini, and their contemporaries The aria fugata was so called, because the accompanying parts were written in fugue This laboured kind of song writing is now judiciously declined

ARIADNÆA, in antiquity, two festivals held at Naxos in honour of two women named Ariadne. One of these festivals was mournful, the other sprightly and cheerful, corresponding with the different characters of the two women.

ARIADNE, daughter of Minos 2d king of Crete, by Pasiphae, fell in love with Theseus, who was shut up in the labyrinth to be devoured by the Minotaur She gave him a clue of thread, by which he extricated himself from the different windings of his confinement After he had conquered the Minotaur, he carried her away and married her; but he afterwards forsook her, though already pregnant Ariadne was so disconsolate upon being abandoned by Theseus, that she hung herself According to some writers, Bacchus loved her after Theseus had forsaken her, and he gave her a crown of seven stars, which, after her death, were made a constellation.

ARIANS, followers of Arius, a presbyter of the church of Alexandria about the year 315, who maintained that the Son of God was totally and essentially distinct from the Father, that he was the first and noblest of those beings whom God had created, the instrument by whose subordinate operation he formed the universe, and therefore inferior to the Father both in nature and dignity; also, that the Holy Ghost was not God, but created by the power of the Son

The Arians owned that the Son was the word, but denied that word to have been eternal They held that Christ had nothing of man in him but the flesh to which the λογος or word was joined, which was the same as the soul in us (See Lardner's Credibility, &c vol ix b i c 69) The Arians were first condemned and anathematized by a council at Alexandria in 320, and afterwards by 380 fathers in the general council of Nice, assembled by Constantine in the year 325 They also underwent various revolutions, persecuting and being oppressed by turns, under succeeding emperors, according to the degree of interest they had in the civil power, till at length Theodosius the Great exerted every possible effort to suppress and disperse them. —The Arians were divided into various sects, of which ancient writers give an account under the names of Semi Arians, Eusebeans, Aetians, Eunomians, Acacians, Psathyrians, and others But they have been commonly distributed into three classes, viz the Genuine Arians, Semi Arians and Eunomians The appellation Arian has been indiscriminately applied, in more modern times, to all those who consider Jesus Christ as inferior and subordinate to the Father, and whose sentiments cannot be supposed to coincide exactly with those of the ancient Arians

ARICA, a sea port town of Peru, in South America It was destroyed by an earthquake in 1605 Great quantities of Guinea pepper are sent from this place to Lima It was the port to the mines of Potosi, but the silver has been carried over land to Lima for many years Lat 18 27 S Lon 71 6 W

ARICA supposed by Camden to be the island of Alderney, on the coast of France.

A'RID *a* (*ar'dus*, Lat) Dry, parched up (*Arbuthnot*)

ARIDED, or ADIGEGE, a fixed star of the 2nd magnitude, marked α in Cygnus

ARI'DITY *s* (from *arid*) 1 Dryness, siccity (*Arbuthnot*) 2 A kind of insensibility in devotion, contrary to unction or tenderness (*Norris*)

ARIES, the battering ram See BATTERING RAM.

ARIES, the Ram, in astronomy, a zodiacal constellation, consisting of 46 stars in this order, as to magnitudes, 0 1 1 3 5.36 It is also the first of the signs of the ecliptic into which the sun enters about the 21st of March, which is the beginning of the spring quarter

ARIES, in zoology See RAM

To ARI'ETATE *v n* (*arieto*, Latin) 1 To butt like a ram 2 To strike in imitation of the blows which rams give with their heads

ARIETA'TION *s* (from *arietate*) 1 The act of butting like a ram 2 The act of battering with an engine called a ram (*Bacon*) 3. The act of striking or conflicting in general (*Glanville*).

ARIETTA (Ital) A short air, or melody The diminutive of aria

ARI'GHT *ad* (from *a* and *right*) 1 Rightly, without mental errour (*Dryden*) 2 Rightly, without crime (*Psalms*) 3 Rightly, without failing of the end designed (*Dryden*)

A'RIL (*arillus*) The outer coat of a seed falling off spontaneously or, inclosing the seed partially (interdum includit partialiter semen Reg Veg) As in coffea, jasminum, cynoglossum, cucumis, dictamnus, diosma, celastrus, euonymus. Scopoli has distinguished such fruits by the name of theca

ARIMANIUS, one of the chief deities of Persia This deity, according to the philosophy of Zoroaster revived by the Manichæans, is the principle of evil, which at last will be totally vanquished by Orosmades, the author of good

ARIMANNI, in antiquity, the denomination of a class of persons employed in agriculture in the middle ages, who were free men

ARIMATHÆA, or RAMATHA, a city of Palestine, placed by Jerome between Lidda and Joppa, but M d'Anville places it a little to the south-east of Lidda and Diaspolis Modern travellers speak of a city called Ramatha, between Joppa and Jerusalem

ARIMINUM, now Rimini, a city of Italy, near the river Rubicon

ARIOLATION *s* (*hariolus*, Lat) Soothsaying, vaticination (*Brown*)

ARIOLI, in antiquity, a kind of prophets, or religious conjurers, who by abominable prayers, and horrible sacrifices at the altars of idols, procured answers to their questions concerning future events

ARION, in fabulous history, a celebrated horse, more famous in poetic history than Bucephalus in the history of Alexander Authors speak variously of his origin, though he is generally allowed to have been produced by Neptune, and nursed by the Nereids Hercules mounted him when he took the city of Elis, and he won the prize for racing at the Nemæan games

ARIOSTO (Ludovico or Lewis,) a celebrated Italian poet, born of a noble family, at the castle of Reggio, in Lombardy, in the year 1474 He translated several pieces out of French and Spanish into Italian, wrote seven satires and five comedies, but his Orlando Furioso, which he began when he was about thirty years of age, is the most celebrated of all his works Passing one day by a potter's shop, he heard the potter uttering a stanza out of the Orlando Furioso, which he pronounced in so bad a manner, that Ariosto being vexed, broke with his stick several of the pots which stood exposed to sale The potter expostulated with him in very severe terms, for injuring a poor man who had never injured him "Yes, you have, said Ariosto, and I have not yet sufficiently revenged myself upon you for the injury you have done me to my face you have broken and mangled a stanza of mine, worth a mark of gold" He was however of an affable, easy, and condescending temper His attachment to poetry did not prevent his engaging in public affairs, for he was employed in embassies and negociations in different parts of Italy He died at Ferrara on the 8th of July 1559 His Orlando Furioso has been translated into English first, by sir John Harrington, in 1634, folio, and again by the ingenious Mr Hoole, in 1783, 8vo

ARISBA, a city of Troas in Asia Minor, a colony of the Mitylenians

To ARI'SE *v n* pret *arose*, particip *arisen* 1 To mount upward as the sun (*Dryden*) 2 To get up as from sleep, or from rest (*Esd*). 3 To come into view, as from obscurity (*Matthew*) 4 To revive from death (*Isaiah*) 5 To proceed, or have its original (*Dryden*) 6 To enter upon a new station (*Cowley*) 7 To commence hostility (*Samuel*)

ARISTA (from *arisah*, Arab) The beard of corn

ARISTÆUS, in fabulous history, the son of Apollo and Cyrene, was born in Lybia, and brought up by the Nymphs He married Autonoe, the daughter of Cadmus, by whom he had Actæon It is also said that he found out the art of extracting honey, and making oil and cheese; and that for his services to mankind, the Gods placed him among the stars, where he is the Aquarius of the Zodiac

ARISTARCHUS, a celebrated Greek astronomer and philosopher, was born at Samos, and flourished about the middle of the third century before Christ. Aristarchus is well known to have maintained the modern opinion with regard to the motion of the earth round the sun, and its revolution about its own centre or axis He also taught, that the annual orbit of the earth is but merely as a point, compared with the distance of the fixed stars His method of determining the distance of the sun from the earth, was by means of the dichotomy of the moon (see DICHOTOMY,) and in this way he concluded, that it contained at least eighteen or twenty times that of the moon from the earth Aristarchus likewise found by methods, the detail of which would be too tedious, that the diameter of the moon bears a greater proportion to that of the earth than that of 43 to 108, but less than that of 19 to

60, so that the diameter of the moon, according to his statement, should be somewhat less than a third part of that of the earth. He also estimated the apparent diameter of the sun at the 720th part of the zodiac. Besides his astronomical discoveries, Aristarchus invented a peculiar kind of hemispherical sun dial, mentioned by Vitruvius, b. ix. c. 9. The only work of this ancient astronomer now extant is a treatise "On the Magnitude and Distances of the Sun and Moon," first published by Vallus, at Venice, fol. in 1498, afterwards by Wallis, with his own notes and Commandine's version, at Oxford, in 1683, 8vo, and again in Wallis's works, vol. III.

ARISTARCHUS, the next most celebrated of this name, was a grammarian of Samos. He was famous for his critical powers, and he revised the poems of Homer with such severity, that ever after all severe critics were called Aristarchi. He wrote above 800 commentaries on different authors, much esteemed in his age (*Her.*) &c.

ARISTEA. In botany, a genus of the class and order triandria, monogynia: petals six, style declined, stigma funnel-form, gaping, capsule inferior, many seeded. The only species is a low plant of the Cape, with narrow veined leaves, and flowers in downy heads.

ARISTIDES. Among the many recorded of this name by ancient writers, no one was so celebrated as an Athenian, son of Lysimachus, in the age of Themistocles, whose great temperance and virtue procured him the sirname of Just. He was rival to Themistocles, by whose influence he was banished for ten years, B. C. 484, but before six years had elapsed, he was recalled. He was at the battle of Salamis, and was appointed chief commander with Pausanias against Mardonius, whom they defeated at Platæa. He died so poor, that the expences of his funeral were defrayed at the public charge: his two daughters, on account of their father's virtues, received a dowry from the public treasury when they were come to marriageable years. He was eminently conspicuous for his moral goodness. When he sat as judge, it is said that the plaintiff, in his accusation, mentioned the injuries his opponent had done to Aristides. "Mention the wrongs you have received," replied the equitable Athenian—"I sit here as judge, and the lawsuit is yours, and not mine." C. Nep. & Plut. in Vita.

ARISTIPPUS of Cyrene, disciple of Socrates, and founder of the cyrenaic sect, differed widely from the doctrine of his master. His maxim was, that pleasure is the chief good of man. Dionysius the tyrant entertained him at his court, where Aristippus revelled in luxury. The tyrant once asked him how it was that the philosophers always sought the company of the great, whereas the latter seldom visited philosophers? to which he replied, "Because the physicians usually go to the sick." Diogenes once said to him, "If Aristippus could be content to live upon vegetables, he would not demean himself in courting the favour of princes;" to which he replied, "If he who censures me were qualified to pay his court to princes, he would not live on vegetables." A person boasting before him that he had read a great deal, Aristippus remarked, "that it was no sign of good health to eat more than one can digest." He flourished about 400 B. C.

ARISTOBRATHRA, in ancient geography, a town of India, on this side of the Ganges (*Ptolemy*).

ARISTOCRACY, a form of government where the supreme power is vested in a body of nobles or principal persons of the state. The word is derived from αριστος *optimus*, and κρατεω *impero, I govern*. Ancient writers on politics prefer the aristocratical form of government to all others, but with little reason, as it is a form of government, in fact, the least favourable to liberty of any. The republic of Venice is a striking instance of this.

ARISTOCRATICAL. *a.* (from *aristocracy*.) Relating to aristocracy (*Ayliffe*).

ARISTOCRATICALNESS. *s.* (from *aristocratical*.) An aristocratical state.

ARISTOLOCHIA, (*aristolochia*, from αριστος, *good*, and λοχια or λοχεια, *parturition*, so called because it was supposed to be of sovereign use in disorders incident to child birth.) Birthwort. A genus of the class and order gynandria, hexandria. Stigmas six; calyxless; corol one-petalled, tubular, tongue shaped; capsule inferior, six-celled. Twenty-seven species, chiefly American or of the South of Europe.

1. A. longa. In medicine, long rooted birthwort. Aristolochia foliis cordatis petiolatis integerrimis obtusiusculis, caule infirmo, floribus solitariis. The root of this plant only is in use; it possesses a somewhat aromatic smell, and a warm bitterish taste, accompanied with a slight degree of pungency. The virtues ascribed to this root by the ancients were very considerable, and it was frequently employed in various diseases, but particularly in promoting the discharge of the lochia: hence its name. It is now very rarely used except in gouty affections, as an aromatic stimulant.

2. A. anguicida. Snake-killing birthwort. The juice of the root of this plant, aristolochia anguicida, foliis cordatis, acuminatis, caule volubili, fruticoso, pedunculis solitariis, stipulis cordatis, of Linnæus, has the property of so stupefying serpents, that they may be handled with impunity. One or two drops are sufficient, and if more be dropt into the mouth they become convulsed. So ungrateful is the smell of the root to those reptiles, that it is said they immediately turn from it. The juice is also esteemed as a preventive against the effects usually produced by the bite of venomous serpents.

3. A. clematitis. (Called clematitis, κληματιτις, from κλημα, *a tendril*, from its climbing up trees or any thing it can fasten upon with its tendrils.) This plant is the aristo-

lochia vulgaris of the pharmacopœias. See ARISTOLOCHIA VULGARIS.

4. A. rotunda. The root of this species, aristolochia rotunda foliis cordatis, subsessilibus, obtusis, caule infirmo, floribus solitariis, of Linneus, is used indiscriminately with that of the aristolochia longa. See ARISTOLOCHIA.

5. A. serpentaria. This plant is the serpentaria virginiana of the pharmacopœias. See SERPENTARIA VIRGINIANA.

6. A. trilobata. Three-lobed birthwort. The root and every part of this plant, aristolochia trilobata, foliis trilobis, caule volubili, floribus maximis, is diuretic, and is employed in America against the bite of serpents.

ARISTOLOCHIA VULGARIS. Aristolochia tenuis. An extract is prepared from this species, aristolochia clematitis, foliis cordatis, caule erecto, floribus axillaribus confertis of Linneus, by the Wirtemberg pharmacopœia, and the plant is retained in that of Edinburgh. It is esteemed as possessing antipodagric virtue.

ARISTOLOCHIA FABACEA. The root of this plant, Fumaria bulbosa, caule simplici, bracteis longitudine florum, of Linneus, was formerly given to restore suppressed menses, and is an anthelmintic. See FUMOSA.

ARISTOPHANES, an Athenian comic poet, was cotemporary with Socrates, Plato, and Euripides. He attacked the designs of those who aimed at the sovereign power in Athens with such success, that he was liberally rewarded by his fellow citizens for his patriotic exertions. His descriptions of the manners of the Athenians were so faithful, that when Dionysius the tyrant wrote to Plato for an account of the state and language of that country, he sent him the plays of Aristophanes. Of all his pieces there are only eleven extant. The Clouds was written with the express view of ridiculing Socrates, who had a great contempt for the comic poets, and to the eternal dishonour of the Athenians, they applauded the poet and persecuted the philosopher. The time of his death is uncertain. The best edition of this writer are those of Kuster, Bergler, Brunck, and Peter Burman, junr. An English translation of The Clouds, has been lately published by Mr Cumberland. The very best edition of Aristophanes is Brunck's of 1783, in 4 vols Gr. and Lat. with many notes and emendations.

ARISTOTELIA, in antiquity, annual festivals celebrated at Stagyra, in honour of Aristotle.

ARISTOTELIA. In botany, a genus of the class and order dodecandria, monogynia. Calyx five-leaved, petals five, style three cleft, berry three celled, with two seeds in each. The only species is a native shrub of Chili, with white flowers and ever green leaves.

ARISTOTELIAN PHILOSOPHY, the philosophy taught by Aristotle, and maintained by his followers. The Aristotelian is otherwise called the Peripatetic Philosophy. See PERIPATETICS.

ARISTOTELIANS, a sect of philosophers, otherwise called Peripatetics, whose dogmata prevailed for a long while in the schools, even in spite of the Cartesians, Newtonians, and other corpuscularians. But the systems of the latter have at length gained the pre eminence, and the Newtonian philosophy in particular is now very generally received. The principles of Aristotle's philosophy, the learned agree, are chiefly laid down in the four books de Cœlo, the eight books of Physical Auscultation φυσικη ακροασεως, belonging rather to logic or metaphysics than to physics. Instead of the more ancient systems, he introduced matter, form, and privation, as the principles of all things; but he does not seem to have derived much benefit from them in natural philosophy. The reader will find a distinct account of the logical part of his philosophy, by Dr Reid, in Lord Kames's Sketches of the History of Man, and Mr Harris has published a sensible commentary on his Categories, under the title of Philosophical Arrangement.

ARISTOTELICA ROTA. See ROTA.

ARISTOTLE, a famous philosopher, son of Nicomachus, a physician, and Festrade, born at Stagyra. After his father's death he went to Athens to hear Plato's lectures, where he soon signalized himself by the brilliancy of his genius. After he had spent 20 years in hearing the instructions of Plato, he opened a school for himself, for which he was accused of ingratitude and illiberality by his ancient master. He was moderate in his meals and slept little. He was 10 years preceptor to Alexander, who received his instructions with deference, and always respected him. Diogenes Laertius has given us a very extensive catalogue of his writings. He has been called by Plato the philosopher of truth; and Cicero compliments him with the title of a man of eloquence, universal knowledge, readiness and acuteness of invention, and fecundity of thought. He was so authoritative in his opinions, that, as Bacon observes, he wished to establish the same dominion over men's minds, as his pupil over nations. Aristotle's logic long reigned in the schools, and has been regarded as the perfect model of all imitation. As he expired, the philosopher is said to have uttered the following sentiment, "Fœde hunc mundum intravi, anxius vixi, perturbatus egredior, causa causarum miserere mei." The letter which Philip wrote to Aristotle has been preserved, and is in these words: "I inform you I have a son, I thank the gods, not so much for making me a father, as for giving me a son in an age when he can have Aristotle for his instructor. I hope you will make him a successor worthy of me, and a king worthy of Macedonia." He died in the 63d year of his age, B. C. 322. It is said that he wrote 4000 books, not more than 20 of these, however, have come down to us. The beautiful and very excellent edition

of Aristotle by Theophilus Buhle (A D 1791,) exceeds in utility and typographical elegance all that have preceded it, though Sylburgius's edition of 1584 is very valuable and complete For the editions of Aristotle's Organum, Rhetorica Poetica and Ethica, consult Dibdin's Introduction to the Classics

ARISTOXENUS, the most ancient musical writer, of whose works any tracts have reached our times He was born at Tarentum, a city in that part of Italy called Magna Græcia, now Calabria He was the son of a musician, whom some called Mnesias, others Spintharus He had his first education at Mantinæa, a city of Arcadia, under his father, and Lamprus of Erythræ, he next studied under Xenophilus, the Pythagorean, and lastly under Aristotle, in company with Theophrastus Suidas, from whom these particulars are transcribed, adds that Aristoxenus enraged at Aristotle having bequeathed his school to Theophrastus, traduced him ever after But Aristocles the Peripatetic, in Eusebius, exculpates Aristoxenus in this particular, and assures us that he always spoke with great respect of his master Aristotle From the preceding account it appears that Aristoxenus lived under Alexander the Great and his first successors His Harmonics in three books, all that are come down to us, together with Ptolemy's Harmonics, were first published by Gogavinus but not very correctly at Venice 1562, in 4to, with a Latin version John Meursius next translated the three books of Aristoxenus into Latin, from the MS of Jos Scaliger, but, according to Meibomius very negligently With these he printed at Leyden, 1616, 4to Nicomachus and Alypius, two other Greek writers on music After this Meibomius collected these musical writers together, to which he added Euclid Bacchius senior Aristides Quintilianus, and published the whole, with a Latin version and notes from the elegant press of Elzevir Amst 1652 The learned editor dedicates these ancient musical treatises to Christina queen of Sweden

ARITHMANCY (ἀριθμός and μαντεία) A foretelling future events by numbers

ARITHMETIC, the art and science of numbers, or that part of mathematics which considers their powers and properties, and teaches how to compute or calculate truly, and with ease and expedition It is by some authors also defined the science of discrete quantity Arithmetic consists chiefly in the four principal rules or operations of Addition, Subtraction, Multiplication, and Division, to which may perhaps be added involution and evolution, or raising of powers and extraction of roots But besides these for the facilitating and expediting of computations, mercantile, astronomical, &c many other useful rules have been contrived, which are applications of the former, such as, the rules of proportion, progression, alligation, false position, fellowship, interest, barter, rebate, equation of payments reduction, tare and tret, &c Besides the doctrine of the curious and abstract properties of numbers.

The origin of Arithmetic is of the highest antiquity Nothing, indeed, being more clear and familiar than the idea of number, the first men must have counted their fingers, their cattle, their days their trees, &c , and it is plain that the formation of societies and the possession of property suppose the necessity of calculation The Phœnicians, who were the first and the most skilful merchants in the world, probably extended the limits of natural arithmetic by inventing signs and compendious processes and in this sense, they may be regarded as the first arithmeticians But we may safely treat as fabulous the opinion of those who tell us that Phœnix the son of Agenor first wrote on arithmetic in the Phœnician language All the nations of which we have any knowledge (except the ancient Chinese, and a people in Thrace mentioned by Aristotle) have chosen the same system of numeration, namely the decuple progression, and represent numbers by the letters of their alphabets The different periods of ten were distinguished, either by accents which affected the numeral letters among the Greeks, or by different combinations of the numeral letters, as among the Romans These methods became very complicated and therefore very inconvenient, when the numbers were considerable The ingenious system of numeration, which forms the basis of our modern arithmetic, was long familiar to the Arabians, before it penetrated into our quarter of the world But the honour of the original invention appears to belong to the Indians For Alsephadi, an Arabian author, says that the Indians boasted of three things, namely, the book intitled Golaila ve dannna (a kind of fables) the method of calculation, and the game of chess And Aben-Ragel, an Arabian author of the 13th century, expressly ascribes the invention of this scheme of arithmetic to the Indian philosophers It is true that some Pythagoreans employed nine particular characters in their calculations, while other used the letters of the alphabet, which were the ordinary signs, and it appears certain that a mode of notation resembling ours was known in the school of Pythagoras But it is more natural to suppose that Pythagoras learned that invention from the Indians, than that they owed it to the Greek It is said, that that philosopher carried the combinations of numbers very far, and that he attached mysterious powers to certain properties of those combinations But this is conjectural all that he could have written on the subject of numbers is lost, and time hath only respected his multiplication table, which we still use In whatever manner the arithmetic which originated in India became known to the Arabians, it is to this last people that we immediately owe that art, and it was not till the year 960 or 970, that it was transmitted to the western

christians by the famous Gerbert, whose merit and wisdom afterwards elevated him to the papal chair, under the name of Silvester II The form of the arithmetical characters has undergone some change The figures used by Alsephadi and Boetius, were almost all different from ours But those of Sacro Bosco and Roger Bacon in the 13th century, had a great resemblance to those used at the present day The Arabians enriched arithmetic with some curious rules, particularly single and double position The ancient arithmetic, however, fell far short of that of the moderns Decimals, which were introduced by Regiomontanus, simplified the management of fractions, and completed our system of numeration Circulating, or repeating, decimals, were first taken notice of by Dr Wallis, or, at least, he was the first who distinctly considered the subject But the greatest and most useful discovery in arithmetic, that of the Logarithms by baron Napier, has carried the art, in all probability, to the utmost pitch of perfection, by simplifying and facilitating its most difficult and tedious operations Monthly Mag vol xiii Keith s Arith

From the time of Napier the authors on arithmetic have become very numerous, but the treatises which the student may consult with most advantage are those by Bonnycastle, Birks, English, Hutton, Vyse, and the excellent performance of Malcolm, which has long been a standard work both on the theory and the practice

Arithmetic, under its present state, is variously divided into different kinds, theoretical, practical instrumental logarithmical, numeral, specious, decimal, dynamical, tetractycal, duodecimal, sexagesimal, &c

ARITHMETIC, THEORETICAL, is the science of the properties, relations, &c of numbers, considered abstractedly, with the reasons and demonstrations of the several rules Such is that contained in the 7th, 8th, and 9th books of Euclid s Elements

Practical Arithmetic, is the art or practice of numbering or computing that is, from certain numbers given, to find others which shall have any proposed relation to the former As, having the two numbers 4 and 6 given, to find their sum, which is 10 or their difference, which is 2, or their product, 24, or their quotient, 1½, or a third proportional to them, which is 9, &c

Specious Arithmetic See ALGEBRA

Binary or Dyadic Arithmetic, is that in which only two figures are used, viz 1 and 0 See BINARY

Common or Vulgar Arithmetic, is that which is concerning integers and vulgar fractions

Decimal or Decadal Arithmetic, is that which is performed by a series of ten characters or figures, the progression being ten-fold, or from 1 to 10s, 100s, &c, which includes both integers and decimal fractions, in the common scale of numbers, and the characters used are the ten Arabic or Indian figures 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

Fractional Arithmetic, or of fractions, is that which treats of fractions, both vulgar and decimal

Harmonical Arithmetic, is so much of the doctrine of numbers, as relates to the making the comparisons, reductions, &c of musical intervals

Arithmetic of Infinites, is the method of summing up a series of numbers, of which the number of terms is infinite This method was first invented by Dr Wallis, as appears by his treatise on that subject, where he shews its uses in geometry, in finding the areas of superficies, the contents of solids, &c But the method of fluxions, which is a kind of universal arithmetic of infinites, performs all these more easily, as well as a great many other things, which the former will not reach

Instrumental Arithmetic, is that in which the common rules are performed by instruments, or some sort of tangible or palpable substance, as sliding rules, &c

Palpable Arithmetic, a name given by Dr Saunderson, who was blind, to an ingenious apparatus by which he was enabled to perform arithmetical operations See the article BLIND

Integral Arithmetic, or of integers, is that which respects integers, or whole numbers

Literal or Algebraic Arithmetic, is that which is performed by letters, which represent any numbers indefinitely

Logarithmical Arithmetic, is performed by the tables of logarithms

Political Arithmetic, is the application of arithmetic to political subjects, such as, the strength and revenues of nations, the number of people, births burials, &c

Sexagesimal or Sexagenary Arithmetic, is that which proceeds by sixties, or the doctrine of sexagesimal fractions a method which, it is supposed was invented by Ptolemy, in the 2d century, at least they were used by him

Tabular Arithmetic, is that in which the operations of multiplication, division, &c are performed by means of tables calculated for that purpose such as those of Herwart, in 1610, and Hutton s tables of powers and products, published by order of the commissioners of longitude, in 1781 By means of these tables, a tolerable arithmetician may extract the cubic or higher roots, to 10 places of decimals, in 5 or 6 minutes

Tetractic Arithmetic, is that in which only the four characters 0, 1, 2, 3 are used A treatise of this kind of arithmetic is extant, by Erhard or Echard Weigel

Universal Arithmetic, is the name given by Newton to the science of algebra, of which he left at Cambridge an excellent treatise, being the text book drawn up for the use of his lectures, while he was professor of mathematics in that university

ARITHMETIC

Arithmetic being the science of computing by numbers, is comprehended in the two general operations of increasing and diminishing. The fundamental rules applied to the former are, **Addition** and **Multiplication**, and to the latter, **Subtraction** and **Division**. *Notation* and *Numeration* being only preparatory to these.

Notation

Is the expressing of any number in writing, either by words or figures. The characters by which numbers are now generally denoted are the ten following, with their simple values.

1,	2,	3,	4,	5,	6,	7,	8,	9,	0
one	two	three	four	five	six,	seven,	eight,	nine	cipher

Besides the values here assigned to the first nine of these characters or figures, they have other values, arising from the situations in which they stand relative to each other when used to express any number greater than nine, as in the following.

2	2	2	2	2	2	2	2	2	2	2	2	2
Billions	Hundreds of Thousands of Millions	Ten of Thousands of Millions	Thousands of Millions	Hundreds of Millions	Tens of Millions	Millions	Hundreds of Thousands	Tens of Thousands	Thousands	Hundreds	Tens	Units

From this it is evident, that the relative values of figures increase in a decuple or tenfold proportion for every place they are removed from that of units towards the left hand; for the first 2 on the right hand expresses only its simple value or two units, but the second denotes two tens, or ten times the value it would have expressed in the first place, the third signifies two hundreds, or its first value a hundred, and its second ten times repeated, the fourth is expressive of thousands, &c. Thus 2222 taken together, denote two thousand two hundred and twenty-two.

The above number is sufficiently extensive for common purposes, but, as greater numbers sometimes occur, it may be proper to observe that if they be divided into periods of six figures each, beginning at the right-hand, the first period is units, the second millions, the third billions, the fourth trillions, the fifth quadrillions, &c. When numbers are further divided into half periods of three figures each, it adds much to the facility of reading large numbers.

The cipher has no value of its own, but increases that of other figures when placed on the right of them, by removing them farther from the unit's place, thus, 50 denotes fifty and 500, five hundred. It is also used to fill up the place or places in a number where no value is expressed, so five hundred and five (there being no tens) is denoted by 505, and four thousand and seven (where neither hundreds nor tens occur) by 4007, and the number forty thousand six hundred and seven, is written 40,607.

Roman Notation

The Romans made and recorded their calculations by means of seven numeral letters, which with their values are as follow.

I,	V,	X,	L,	C,	D,	M
1,	5,	10,	50,	100,	500,	1000

The intermediate and greater numbers they formed by different combinations of these seven. When the letter which denoted the greater value stood on the left-hand the number was expressed by their sum, as LX, sixty, but when on the right, by their difference, as XL, forty.

A line drawn horizontally over any letter, increased its value a thousand fold, as $\overline{C}$ expressed a hundred thousand, $\overline{M}$, a million. For 500 they also wrote IↃ and the addition of every Ↄ increased the former value in a decuple proportion, so IↃↃ was 5000, and IↃↃↃ, 50 000. A thousand was likewise denoted by CIↃ, and its value increased as in the last method by adding C and Ↄ, thus CCIↃↃ equalled 10 000.

The following columns will be of service in attaining this notation by which chapters, sections, and dates of books are frequently expressed.

I	1,	X	10,
II	2,	XX	20,
III	3,	XXX	30,
IV,	4,	XL,	40,
V,	5,	L	50,
VI	6	LX	60,
VII,	7,	LXX,	70,
VIII,	8,	LXXX	80,
IX	9,	XC,	90

The intermediates of these are formed by writing each of the numbers in the left-hand column respectively on the right-hand side of each in the right-hand column,

as XI, 11, XII, 12, &c. XXI, 21, XXII, 22, &c.

Numeration

Is the reverse of Notation, or the reading of numbers, and this is done by using the words which they denote, as shown above. Thus, 1 808 is read one thousand and eight hundred and eight.

The rules of addition subtraction multiplication, and division are both simple and compound as they relate to quantities of one or more denominations.

Simple Addition

Consists in collecting two or more numbers of the same denomination into one sum or total, which is done as follows.

The character denoting addition is +, named plus.

Rule. Write the numbers under each other, units under units, tens under tens, &c. add up the column of units, and beneath it set the right hand figure of the sum, carrying the rest, if any, to the next column, which add up and set down as before, and so on to the last column to the left hand, the whole sum of which must be put down. Then will this new number be the sum of all the others, as was required.

Examples

34786	498637
17248	332786
39637	792384
11003	167842
93704	674030
64071	368694
260449 sum	2834373 sum

Proof. Add up all but the top number, which being afterwards added to the sum of the others, will make it the same as that found before if the

work be right, or begin at the top and add downwards

Simple Subtraction

Consists in finding the difference between two numbers of the same denomination The character by which subtraction is denoted is called minus —

Rule Write the numbers under each other as in addition, the less under the greater Begin with the units, and take each figure in the lower number from that above it, and set down the remainder as in addition When any figure in the lower line is greater than that above it, suppose ten to be added to the upper one, and having taken the bottom figure from this sum, and set down the remainder as before carry one to the next lower figure on the left, and so on through the whole number, which will give the difference required

Proof Add this difference to the less number, and the sum will be equal to the greater when the work is right.

Examples

37869473	78674216
18693204	49086432
19176269 diff	29587784 diff

Simple Multiplication

Consists in obtaining the amount of any simple number, taken as many times as there are units in another proposed number, and is therefore, only a compendious method of performing simple addition Or multiplication may be defined as in algebra The character for multiplication is ×

The number multiplied is called the multiplicand, that by which it is multiplied, the multiplier, and the one obtained by the multiplication, the product

Multiplication Table

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	[illegible]	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	9	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

Case I *When the multiplier does not exceed 12*

Rule Having set the multiplier under the unit's place of the multiplicand, multiply each figure of the latter by the former, set the right-hand figure of each product under the figure multiplied, and carry the rest, if any to the next product, the result will be the whole product required

Note When the multiplier is any number between 12 and 20, multiply by the unit's figure, add to the product the figure which stands on the right of that multiplied, and to the tens in the product of the last figure, add the figure itself, and the whole product will be obtained in one line

Proof Change the multiplier into the multiplicand, and the contrary, and the product will agree with the former when the work is right

Examples

Multiplicand	93478604	478640473
Multiplier	8	18
Product	747828832	8615528514

Case II *When the multiplier consists of several figures*

Rule Multiply by each figure separately, setting the first figure of each product under the figure multiplied by and add the several products together, then their sum will be the whole product

Examples

314786	4780483
375	5073
1573930	14341449
2203502	33463381
944358	23902415
118044750	24251390259

Case III *When the multiplier is the product of any two numbers not exceeding 12*

Rule Multiply by one of the numbers first and then this product by the other which will give the whole product required

Note If there be ciphers on the right of either the multiplicand or multiplier, or both find the product of the other figures by one of the preceding rules, and to the right of it annex as many ciphers as were omitted

Examples

748321 × 42	8704600 × 720
7	9
5238247	783414
6	
31429482	6267312000

Simple Division

Is a compendious method of finding how often the less of two simple numbers is contained in the greater, and consequently is only a ready way of performing subtraction The character denoting division is ÷ See Division in Algebra

The number to be divided is called the dividend that to be divided by, the divisor, and the number of times the former contains the latter, the quotient There is frequently a remainder after the division is finished, and which must always be less than the divisor

Case I *When the divisor does not exceed 12*

Rule Write the divisor on the left hand side of the dividend, separating them by a small curve line Find how many times it is contained in as many of the left hand figures of the dividend as are necessary, and set the number under the right hand figure used then carry the remainder, if any, as so many tens to the next dividend figure, and divide the sum as before, and so on to the unit's place of the dividend Observe, that there must be a quotient figure under every one of the dividend to the right of that under which the first quotient figure stands, and if no significant figure

occur its place must be supplied by a cipher, also if there be any remainder it must be set on the right of the quotient, with the divisor under it and a small line between them

Proof Multiply the quotient by the divisor, and the remainder added to the product will give the dividend

Ex I 8)786349 Ex II 12)38479041

$98293\frac{5}{8}$ $3206586\frac{9}{12}$

Case II *When the divisor consists of several figures*

Rule Set the divisor on the left-hand of the dividend as before and let the quotient be placed in a similar manner on the right Multiply the divisor by the first figure of the quotient found as above and set the product under the left hand figures of the dividend from which subtract it, and to the right of the remainder annex the next figure of the dividend find another figure of the quotient and so on until all the figures of the dividend are used

Note If there be ciphers on the right hand of the divisor cut them off, and omit the same number of figures on the right of the dividend then divide as above, and annex the figures omitted to the right hand of those remaining after the division is finished for the true remainder

Ex I 374)76 -14(040
748
———
1521
1496
———
254 rem
———

Ex II 783,00)567-7,11(-2
5481
———
2157
1466
———
67111 rem
———

Case III *When the divisor is the exact product of two numbers not exceeding* 12

Rule Divide by one of the numbers first and then the quotient by the other And, in order to obtain the true remainder, multiply the last remainder by the first divisor, and the first remainder being added to the product will give the true one

Note The method is not confined to two numbers but when there are more finding the true remainder is considered as too complicated an operation for this place

Ex Let 74694 be divided by 42

6)746948 ⎧ 3
7)124491—2 and ⎨ 18
——— ⎪ 2
17784—3 ⎪ ——
——— ⎩ 20 true rem

Reduction

Is the operation by which quantities are brought from one name or denomination to another without changing their value, and is principally used for money, weights, and measures, for tables of which, see **Weights** and **Measures**

Rule Quantities are brought from a higher denomination to a lower by multiplying by as many of the lower as make one of the higher—from a lower to a higher by dividing by as many of the former as make one of the latter

Ex I Reduce 57*l* 7*s* 4*d* into pence
20
———
1147 shillings
12
———
13768 pence
———

II Bring 497386 farthings into crowns
4)497386
———
12)124346—2
———
5)10362—2
———
2072 2*s* $2\frac{1}{2}$*d* ans
———

Compound Addition

Is the collecting of several quantities of different denominations into one sum or total quantity

Rule Place the numbers so that those of the same denomination may stand directly under each other and draw a line below them Add up the figures in the lowest denomination, and find, by reduction, how many units, of the next higher denomination, are contained in their sum Set down the remainder below its proper column and carry those units to the next denomination which add up in the same manner as before Proceed thus through all the denominations, to the highest whose sum together with the several remainders, will give the answer sought

The method of proof is the same as in simple addition

Ex I

£	s	d
34	15	$2\frac{1}{4}$
27	12	$9\frac{3}{4}$
30	9	$11\frac{1}{2}$
79	15	$4\frac{1}{4}$
172	13	$3\frac{3}{4}$

Ex II

£	s	d
51	18	$9\frac{1}{4}$
15	9	$11\frac{1}{2}$
76	4	9
59	19	$7\frac{1}{2}$
203	13	$1\frac{1}{4}$

Ex III

lb	oz	dwt	gr
54	9	17	15
97	8	15	7
41	3	19	23
88	11	7	16
282	10	0	13

Compound Subtraction

Is the operation by which the difference of two quantities of several denominations is found

Rule Place the less number under the greater, so that like denominations may stand under each other, and proceed as in simple subtraction, observing only that when the lower number exceeds that above it, as many must be added to the latter as make one in the next column to the left

Proof The method of proof is the same as in simple subtraction

Ex I

£	s	d
79	17	$8\frac{3}{4}$
35	12	$4\frac{1}{4}$
44	5	$4\frac{1}{2}$
79	17	$8\frac{3}{4}$

Ex II

£	s	d
103	3	$2\frac{1}{2}$
71	12	$5\frac{3}{4}$
31	10	$8\frac{3}{4}$
103	3	$2\frac{1}{2}$

Ex III. c qrs lb
5 0 17
3 2 11

5 0 17

Compound Multiplication

Consists in finding the amount of any number, of different denominations, taken any assigned number of times, and like simple multiplication admits of several cases

Case I *When the multiplier does not exceed 12*

Rule Set it under the lowest denomination of the number to be multiplied, multiply the denomination immediately above it, and having ascertained the number of integers of the next higher denomination in the product, by the rule of reduction, set the remainder under the same denomination, and carry the integers to the product of the next higher denomination, and continue the same process unto the highest denomination, the whole product of which together with the several remainders, taken as one compound quantity, will be the whole product required

Proof The same as in simple multiplication

Ex What is the value of 9lb. of tea at 7*s* 9½*d* ?

7*s* 9½*d*
9

£ 3 10 1½

Case II *When the multiplier exceeds 12, and is the product of small numbers*

Rule Multiply successively by its component parts instead of the whole number at once, as in simple multiplication

Ex 16 cwt of cheese at 1*l* 18*s* 8*d* per cwt
1*l* 18*s* 8*d*

7 14

30*l* 18*s* 8*d* Answer

Case III *If the multiplier cannot be produced by the multiplication of small numbers*

Rule Find the nearest to it, either greater or less, which can be so produced, then, multiply by the component parts as before, and for the odd parts, add or subtract according as is required

Ex 17 ells of holland, at 7*s* 8½*d*. per ell
7*s* 8½*d*

1 10 10
4
6 3 4
7 8½
£ 6 11 0½

Compound Division

Is the operation by which any number, of different denominations, is divided into any required number of parts

Case I *When the divisor does not exceed 12*

Rule. Place the divisor on the left of the dividend, as in simple division —Begin at the left-hand, and divide each denomination by the divisor, setting down the quotients under their respective dividends If there be any remainder after this division, reduce it to the next lower denomination, which add to the number, if any, belonging to that denomination, and divide the sum by the divisor Set down again this quotient, reduce its remainder to the next lower denomination again, and so on through all the denominations to the last

Proof The same as in simple division

Ex Divide 225*l* 2*s* 4*d* by 2

£ s d
2) 225 2 4

£. 112 11 2 the quotient

Case II *When the divisor exceeds 12, and is the product of small simple numbers*

Rule Divide by each of the numbers successively as in simple division

Ex What is sugar per cwt if 32 cwt cost 61*l* 17*s* 4*d*?

£ s d
8) 61 17 4

4) 7 14 8

£ 1 18 8 answer

Case III *When the divisor cannot be produced by the multiplication of small numbers*

Rule Divide by the whole divisor at once, as in Case II in Simple Division.

Ex Divide 224*l* 0*s* 6*d* by 51

51) 224*l* 0*s* 6*d*. (4*l* 7*s* 10*d* quotient
204

20
20

7400
357

43
12

522
51

Proportion

Is that comprehensive branch of calculation which enables us to find a fourth quantity having a certain relation to three given quantities This rule, on account of its great and extensive usefulness, is oftentimes called The Golden Rule of Proportion, for, on a proper application of it and the preceding rules, the whole business of arithmetical, as well as every mathematical enquiry depends The rule itself is founded on this obvious principle, that the magnitude or quantity of any effect varies constantly in proportion to the varying part of the cause thus, the quantity of goods bought is in proportion to the money laid out, the space gone over by an uniform motion is in proportion to the time, &c It is usually divided into the three distinct parts or rules of Direct, Inverse, and Compound Proportion

The characters used to denote proportion are , and the terms are written thus 2 4 8 16, and read as 2 is to 4, so is 8 to 16

Direct Proportion

Is employed in finding, from three given numbers,

a fourth, which shall have the same relation to the third as the second has to the first,

Thus as 2 : 4 :: 3 : 6,
Or 4 : 2 :: 6 : 3

Rule State the question, that is, place the terms so, that the first may be one of the terms of supposition, the second of the same nature as the fourth or term sought, and the third, the term of demand Then bring the first and third terms into the same denomination, and the second to the lowest name mentioned Multiply the second and third terms together, and divide the product by the first, and the quotient will be the answer in the same name as the second term, and which may be brought to any other denomination required

Proof The method of proof is by inverting the question, and in this manner each question will furnish four, and thus supply a very useful exercise

Ex If $12lb$ of cheese cost $9s\ 6d$ what will 4 cheeses cost each weighing $1qr\ 6lb$?

If $12lb$	$9s\ 6d$	$1qr\ 5lb \times 4$	
	12	28	
	114	33	
		4	
		132	
		114	
		528	
		1452	
		1) 15048	
		12) 1254 pence	
		20) 104 6	
		£ 5 4 6	

Inverse Proportion

used when three quantities are given to find a ...rth that shall have the same relation to the ...cond as the first has to the third,

Thus as 2 : 6 :: 4 : 3
or 4 : 3 :: 2 : 6

Rule State the question, and reduce the ...ms as in direct proportion Then multiply the ...st and second terms together, and divide the ...duct by the third, and the quotient will be the ...swer as before

Proof Reverse the operation

Ex An engineer having raised 100 yards of a ...rtain work in 24 days with 5 men, how many ... must he employ to finish a like quantity of ...rk in 15 days?

	ds	men	ds	men
As	24	5	15	8

15) 120 (8 Answer
120

Compound Proportion

... rule in which more than three terms are given ...o find another, dependant upon them This rule ... of general use, extending to all arithmetical ...rations where proportions are concerned it ...ay be performed by means of the following ...rections

1 Set down the terms expressing the conditions of the question, in one horizontal line, separating the producing terms from the produced, that is to say those which necessarily and jointly tend to produce or to modify any effect, and the constituent parts of such effect

2 Under each conditional term, set its corresponding one in another line

3 Multiply the producing terms of one line, and the produced terms of the other line, continually, and take the result for a dividend

4 Multiply the remaining terms continually, and let the product be a divisor

5 The quotient of this division, will be the term required

N B In a question where a term is only understood, and not expressed it may always be represented by unity The required term may be denoted either by Q or by an asterisk

Ex 1 If 40 acres of grass be mowed by 8 men in 7 days how many acres can be mowed by 24 men in 28 days equally long?

M	D		A
8	7	×	40
24	28		Q

$$Q = \frac{24 \times 28 \times 40}{8 \times 7} = 480 \text{ acres} \quad \text{Answer}$$

Ex 2 If 48 men in $6\frac{1}{2}$ days of 12 hours long, dig a trench of 24 yards long, 2 deep, and 3 wide what length of trench of similar earth, 3 yards deep and 5 wide can be dug by 24 men in 180 days, of 10 hours long?

M	Da	H		L	De	W
48	6	12	×	24	2	3
24	180	10		Q	3	5

$$Q = \frac{24 \times 180 \times 10 \times 24 \times 2 \times 3}{48 \times 6 \times 12 \times 3 \times 5} = 120 \text{ yards} \quad \text{Ans}$$

Practice

Is a compendious method of performing such questions in direct proportion as have unity for the first term, it obtained its name from being in daily use among merchants and tradesmen, as a ready and concise manner of answering most questions that occur in business

An aliquot part of any number is such a part as being taken a certain number of times, will exactly make that number, thus $\frac{1}{4}$ is an aliquot part of 1, and 2 of 6, for the former being taken 4 and the latter 3 times, make the numbers 1 and 6

General Rule Suppose the price of the given quantity to be $1l$ or $1s$ as is most convenient, then will the quantity itself be the answer at the supposed price Divide the given price into aliquot parts, either of the supposed price, or of another, and the sum of the quotients belonging to each will be the true answer required

Proof By direct proportion

Ex What is the value of 526 yards of cloth, at $3s\ 10\frac{3}{4}d$ per yard

		526			Ans at $1l$				
$3s\ 4d$	is $\frac{1}{6}$	87	13	4	ditto at	0	3	4	
$4d$	is $\frac{1}{10}$	8	15	4	ditto at	0	0	4	
$2d$	is $\frac{1}{2}$	4	7	8	ditto at	0	0	2	
$\frac{3}{4}$	is $\frac{1}{8}$	0	10	$11\frac{1}{2}$	ditto at	0	0	$0\frac{3}{4}$	
		101	7	$3\frac{1}{2}$	ditto at	0	3	$10\frac{3}{4}$	

the full price

In the above example, it is plain that the quantity 526 is the answer at $1l$, consequently,

tity, or 87*l* 13*s* 4*d*. is the price of 3*s* 4*d* in like manner, as 4*d* is the $\frac{1}{10}$ part of 3*s* 4*d*. so $\frac{1}{10}$ of 87*l*. 13*s* 4*d* or 8*l* 15*s* 4*d* is the answer at 4*d* And by reasoning in this way 4*l* 7*s* 8*d* will be shewn to be the price at 2*d* and 10*s* 11½*d*. the price at ¼ Now as the sum of all these parts is equal to the whole price (3*s* 10¾*d*), so the sum of the answers belonging to each price will be the answer at the full price required And the same will be true in any example whatever

Vulgar Fractions

A fraction is an expression for part of a unit, and is denoted by two numbers placed one above another with a line between them, as ½ or $\frac{}{11}$ The number below the line shows how many parts the integer is supposed to be divided into, and is called the denominator, that above it denotes the number of parts expressed by the fraction and is called the numerator The unit may represent a whole of any kind and the parts into which it is supposed to be divided, are fractions of that whole

It follows from the manner of representing fractions, that when the numerator is increased, the value of the fraction becomes greater, but, when the denominator is increased, the value becomes less Hence we may infer, that if the numerator and denominator be both increased, or both diminished, in the same proportion, the value is not altered, and, therefore, if we multiply both by any number whatever, or divide them by any number which measures both, we shall obtain other fractions of equal value Thus, every fraction may be expressed in a variety of forms, which have all the same signification

Fractions are either proper, improper, simple, or compound

When the numerator is less than the denominator the fraction is proper, and its value less than 1, as ½ If the numerator be equal to or greater than the denominator, the fraction is improper, and its value is equal to or greater than 1, as $\frac{4}{4}$ or $\frac{12}{12}$ A simple fraction has only one numerator and one denominator, as ⅔ or $\frac{11}{13}$ But a compound fraction has more than one numerator and denominator, or consists of several simple fractions, connected by the word of, as ⅔ of ⅞ of $\frac{5}{14}$

A mixed number is composed of an integer and a fraction, as 8⅔

Besides the characters +, —, × and — already explained, and which greatly abbreviate the expressions in fractions there is commonly used =, signifying equal to

Reduction of Vulgar Fractions

Consists in changing from one form to another, in order to render them more convenient for the operations of addition, subtraction, &c and is usually distinguished into several cases

Case I *To reduce fractions to their lowest terms*

Rule Since when both numerator and denominator of any fraction are diminished in the same ratio its value is not changed, if both the terms be divided by any number that will exactly divide them and the operation continued until they have no common divisor but 1, the fraction will be in its least terms

Ex Reduce $\frac{1}{2}$ to its least terms

$\frac{}{}$ = $\frac{2}{}$ = $\frac{36}{}$ = $\frac{}{}$ = = the answer

Note If the terms of the fraction are large numbers, the greatest common measure or number that will divide them both, may be found by dividing the greater by the less, and last divisor by the last remainder, and so on, till nothing remains; then the last divisor will be the greatest common measure required

Case II *To reduce an improper fraction to its equivalent whole or mixed number*

Rule Divide the numerator by the denominator, and the quotient will be the answer

Ex Reduce $\frac{957}{43}$ to a whole or mixed number

$\frac{957}{43}$ = 957 — 43 = $22\frac{11}{43}$, answer

Case III *To reduce a mixed number to its equivalent improper fraction*

Rule This operation is the reverse of the former therefore, multiply the whole number by the denominator of the fraction, and add the numerator to the product, then set that sum above the denominator for the fraction required

Ex Reduce $23\frac{2}{5}$ to a fraction

$$23\frac{2}{5}=\frac{(23\times 5)+2}{5}=\frac{117}{5}\text{, the Answer}$$

Case IV *To reduce a compound fraction to an equivalent simple one*

Rule Multiply all the numerators together for the numerator and all the denominators together for the denominator of the fraction required

When the same factors are found in both the terms, they may be struck out of each

Ex Reduce ³ of $\frac{5}{7}$ of ¾ to a simple fraction

$\frac{2+1+3+5+3}{3+2+5+7+4}$, by cancelling 2 3 and 5 in both the terms the fraction becom $\frac{1+}{+4}$ the

Case V *To reduce fractions of different denominators to equivalent fractions, having a common denominator*

Rule Multiply each numerator by all the denominators except its own, for the new numerators, and multiply all the denominators together for a common denominator When the given fractions are not simple ones, they must be reduced to such by the proper rules

Ex Reduce and ³ to a common denominator

$1\times 3\times 4=12$ the new numerator for ½
$2\times 2\times 4=16$ - - ditto for
$3\times 2\times 3=18$ - - ditto for ¾
$2\times 3\times 4=24$ the common denominator

Therefore the equivalent fractions are $\frac{12}{24}$, $\frac{1}{24}$ and $\frac{18}{24}$ Or the whole operation of multiplying may be very well performed mentally, and only set down the results and given fractions thus ½, ⅔, ¾ = $\frac{12}{24}$, $\frac{1}{}$, $\frac{18}{24}$ = $\frac{6}{12}$, $\frac{8}{12}$ $\frac{9}{12}$, by abbreviation

Notes 1 When the denominators of two given fractions have a common measure, divide them by it, and multiply the terms of each given fraction by the quotient arising from the others denominator

2 When the less denominator of two fractions exactly divides the greater, multiply the terms of that which has the less denominator by the quotient

3 When more than two fractions are proposed it is sometimes convenient, first to reduce two of them to a common denominator, then these and third, and so on, till they are all reduced to their least common denominator

4. The value of fractions in parts of the integer may be found, as well as the operations of reducing them from one denomination to another, performed by the rules for compound division, and reduction of integers

Addition of Vulgar Fractions

Rule Reduce the proposed fractions to common denominator, if necessary, by the preceding rules, add the numerators together, and set their sum over the common denominator, and

this fraction reduced as much as it will admit of, will be the answer.

Ex. Add $\frac{5}{8}$, $7\frac{1}{2}$ and $\frac{1}{3}$ of $\frac{3}{4}$ together.

$\frac{5}{8}+7\frac{1}{2}+\frac{1}{3}$ of $\frac{3}{4}=\frac{5}{8}+\frac{15}{2}+\frac{1}{4}=\frac{5}{8}+\frac{60}{8}+\frac{2}{8}=\frac{67}{8}=8\frac{3}{8}$ ans.

Subtraction of Vulgar Fractions

Rule. Prepare the fractions as for addition, and set the difference of the numerators over the common denominator for the answer.

Ex. What is the difference between $\frac{2}{3}$ and $\frac{2}{9}$ of $\frac{3}{7}$?

$\frac{2}{9}$ of $\frac{3}{7}=\frac{6}{63}=\frac{2}{21}$, and $\frac{2}{3}=\frac{14}{21}$,

Therefore $\frac{14}{21}-\frac{2}{21}=\frac{12}{21}=\frac{4}{7}$ the required difference.

Multiplication of Vulgar Fractions

Rule. Reduce the given numbers by the preceding rules if necessary, and multiply the numerators and denominators respectively together for the answer.

Ex. What is the continued product of 4, $7\frac{1}{2}$, $\frac{2}{3}$,

First, $4=\frac{4}{1}$, and $7\frac{1}{2}=\frac{15}{2}$

Then, $\frac{4\times15\times2\times5\times6}{1\times2\times3\times6\times7}=\frac{4\times15\times5}{3\times7}=\frac{4\times5\times5}{1\times7}$

$\frac{4\times5\times5}{7}=\frac{100}{7}=14\frac{2}{7}$ the answer.

Division of Vulgar Fractions

Rule. Prepare the fractions as in multiplication, then divide the numerators by each other and also the denominators, if they will exactly divide, but if not invert the divisor and multiply them for the answer.

Ex. To divide $\frac{1}{5}$ of 19 by $\frac{2}{3}$ of $\frac{3}{4}$.

First $\frac{1}{5}$ of $19=\frac{1\times19}{5\times1}=\frac{19}{5}$, and $\frac{2}{3}$ of $\frac{3}{4}=\frac{6}{12}=\frac{1}{2}$,

Then $\frac{19}{5}\div\frac{1}{2}=\frac{19\times2}{5\times1}=\frac{38}{5}=7\frac{3}{5}$ the req. quotient.

Note. Fractional questions in proportion are resolved by the same rules as those in whole numbers, after reducing their terms by the preceding methods when necessary.

Decimal Fractions

A decimal is a fraction, having always some power of 10 for its denominator, which consists of either 10, 100, 1000, &c. denoting the number of equal parts into which the integer or whole is supposed to be divided, as, $\frac{2}{10}$, $\frac{2}{100}$, $\frac{2}{1000}$, &c. But, for the sake of brevity, the numerator only is expressed like a whole number with a point on the left of it, as .2, .02, .002, &c. and which must always consist of as many figures as there are ciphers in the denominator, the places between the significant figures and the point being supplied with ciphers when necessary, as above. Consequently the same number of figures on the right of the decimal point has always the same denominator. Thus, the denominator of the fractions .5000, .0746, .0005, is 10000. And hence it appears that the value of a decimal fraction is not altered by ciphers on the right hand, for .5000 (or $\frac{5000}{10000}$) when reduced to its lowest terms is the same as .5, each being equal to $\frac{1}{2}$.

In mixed numbers the decimals are separated from the integers by the point: thus, $25\frac{2}{100}$ is written 25.02. It is also evident that the value of decimals decreases in the same tenfold proportion from the point towards the right hand, as that of integers increases towards the left.

Addition and Subtraction of Decimals

Rule. Place the numbers so that the decimal points may stand directly under each other, then add, and subtract, as in whole numbers, setting the point in the sum, or difference under the points above.

Ex.	32.035	from	13.348
	136.374	take	9.2993
	160.63		
	12.3645		4.0487
	341.4035		

Multiplication of Decimals

Rule. Place the factors, and multiply them together the same as if they were whole numbers. Then point off in the product just as many places of decimals as there are decimals in both the factors. But if there be not so many figures in the product, then supply the defect by prefixing ciphers.

Ex. Multiply .321096
by .2465

1605480
1926576
1284384
642192

Ans. .0791501640 the product.

Notes. 1. When the multiplier is with any number of ciphers, as, 10, 100, &c. the multiplication is performed by removing the decimal point as many places to the right hand as there are ciphers in the multiplier, annexing ciphers if necessary.

2. When the product would contain many decimal places the work may be considerably shortened and only as many decimals retained as may be thought necessary, by setting the unit's place of the multiplier under that decimal place of the multiplicand which is to be the last in the product, and disposing of the other figures in an inverted order.

Reject all the figures of the multiplicand to the right of the multiplying figure, and adding to the first figure of every line what would arise from the product of the figures omitted, by carrying 1 from 5 to 14, 2 from 15 to 24, 3 from 25 to 34, &c. and setting down the products with the right hand figure of each directly below each other—then their sum will be the required product, generally true to the nearest unit in the last figure.

Ex. Multiply 27.14986 by 92.41035, and retain only four places of decimals in the product.

27.14986
53014.29

24434874
542997
108599
2715
81
14

2508.9280

Division of Decimals

Rule. Divide as in whole numbers, and the quotient will contain as many places of decimals as those in the dividend exceed those in the divisor: therefore, when there are not so many the deficiency must be supplied by ciphers on the left. Also, when the dividend does not contain the divisor, or there is a remainder, ciphers may be annexed to the right of it, and the division continued at pleasure.

Ex. Divide 192 by 5 423.

5 423) 192 0000 (35 404, &c quotient
16269
———
29310
27115
———
21950
21692
———
25800
21692
———
4108 remainder

NOTES 1 When the divisor is an integer with any number of ciphers on the right of it, they may be omitted, and the point in the dividend removed an equal number of places to the left, and then the division performed as before Consequently when the divisor is 1 with ciphers, the division is unnecessary

2 When the quotient is required to contain only a certain number of decimals, take as many figures from the left of the divisor as the quotient is to contain, and divide as before, observing to carry for the figures omitted as in the second note to multiplication But instead of annexing a dividend figure to the remainder for every figure of the quotient, omit one more in the divisor —When the number of figures in the divisor is less than the number required in the quotient, ciphers must be added to the former The work will be much contracted if the subtractions be made mentally, and the remainders only set down, as below

Ex Divide 2508 92806 by 92 41035, and retain only decimals in the quotient, which will then consist of six places

92 4103,5)2508 928,06(27 1498
660721
13849
4608
912
80
6

3 A vulgar fraction is reduced to an equivalent decimal by annexing ciphers to the numerator and dividing by the denominator, and the number of decimals in the quotient will be equal to that of the ciphers used Thus $\frac{3}{4}$ = 75, $\frac{7}{8}$ = 875, $\frac{3}{7}$ = 42857142, &c and $\frac{1}{9}$ = 11111, &c In many cases, as in the last two there is no limit to the division, and such quotients are called circulating decimals, for the treatment of which, see CIRCULATES

4 The value of a decimal in terms of the inferior denominations, is found and integers or decimals reduced to equivalent decimals of higher denominations, by the rule for reduction of integers Also proportion in decimals is performed, after proper reduction of the terms as in whole numbers.

DUODECIMALS

Are vulgar fractions, the denominators of which increase from unity in a twelve fold proportion, the division and sub-division of the integer being into 12th's instead of 10th's, as in the decimal scale

This method of division seems to have been adopted for the purpose of finding the contents of artificer's work, the dimensions of which are usually taken in feet, inches, and quarters, parts smaller than these being rejected

RULE. Set down the two dimensions, feet under feet, and inches under inches —Begin the multiplication with the feet in the multiplier, and the inches in the multiplicand, carrying 1 for every 12 from each lower denomination to the next higher, and set the remainders directly under the corresponding terms of the multiplicand Then multiply by the inches in a similar manner, and set the result one place to the right of the former product, or annex the lowest denomination as a fraction to the next higher And the sum of their products, 1 being carried for every 12 in adding, will be the whole product required

Ex 1	Multiply 4f	7in	2 Multiply	14f	9in
	by 6	4		by 4	6
	27	6		59	0
	1	$6\frac{1}{3}$		7	$4\frac{1}{2}$
	Ans 29	$0\frac{1}{3}$		Ans 66	$4\frac{1}{2}$

NOTES 1 The numbers in the second columns of the above examples generally called inches, are neither lineal nor square inches, but 12 th parts of a foot, or small rectangles, 1 inch broad and 12 long Therefore, to obtain square inches, multiply them by 12 Thus, the answer to the last example is 66 feet, 54 square inches

2 The answer, however, in many examples, is easier obtained by the usual method of vulgar or decimal fractions Thus, in the last example,

14f 9in = $14\frac{3}{4} = \frac{59}{4}$
and 4 6 = $4\frac{1}{2} = \frac{9}{2}$
then $\frac{59}{4} \times \frac{9}{2} = \frac{531}{8} = 66\frac{3}{8}$ = 66 $4\frac{1}{2}$ answer
Or, 14, 9 = 14 75 and 4, 6 = 4 5
then 14 75 × 4 5 = 66 375 = 66, $4\frac{1}{2}$ as above

INVOLUTION

Is the raising of powers from any given number, as a root A power is the product obtained by multiplying the root a certain number of times by itself And the number denoting how often the root is to be increased by itself is called the index, and placed above the number Or, a power may be defined, the last of that number of continued geometrical proportionals to unity, which is expressed by the index, the first of them being the number itself when the power is integral—when it is fractional, the number of continued proportionals is denoted by the numerator of its index, and the first of them is that root of the number which is expressed by its denominator

Ex Required the 4th power of 7

$7^4 = 7 \times 7 \times 7 \times 7 = 2401$, the answer

EVOLUTION,

Or the extraction of roots, is the operation by which such a number or root is found, as being multiplied a certain number of times by itself, will produce that power, and it is denominated the square, cube, 4th, 5th, root, &c according as it is, when raised to the 2d, 3d, 4th, 5th, &c power, equal to that power Thus, 2 is the square root of 4, because 2 × 2 = 4, and 4 is the cube root of 64, because 4 × 4 × 4 = 64, and so on

A root may also be defined by the second definition of a power, above, by only substituting first for last, and the contrary

Although there is no number of which we cannot find any power exactly, yet there are many numbers of which a precise root can never be determined But, by the help of decimals, we can approximate towards the root, to any assigned degree of exactness.

Those roots which are found by approximation only are called surd roots, and those which are perfectly accurate are termed rational roots

Roots are generally denoted, as in algebra, by writing the character $\surd$ before the power, with the index of the root against it thus, the third root of 70 is expressed $\sqrt[3]{70}$, and the second root of it is $\sqrt{70}$ the index 2 being always omitted when the square or second root is designed

If the power be expressed by several numbers, with the sign + or − between them, a line is drawn from the top of the sign over all the parts of it, thus, the third root of 28−13 is $\sqrt[3]{28-13}$

Roots are sometimes designed like powers, with fractional indices, thus, the square root of 5 is $5^{\frac{1}{2}}$, the third root of 19 is $19^{\frac{1}{3}}$, and the fourth root of 40−12 is $\overline{40-12}^{\frac{1}{4}}$, or $(40-12)^{\frac{1}{4}}$

EXTRACTION OF THE SQUARE ROOT

Consists in finding a number, which being multiplied once by itself will produce the power

RULE Divide the given number into periods of two figures each, beginning at the unit s place and proceeding to the left hand in integers, and to the right in decimals —Find the greatest square in the first period on the left hand, and set its root on the right hand of the given number, after the manner of a quotient figure in division —Subtract the square thus found from the said period, and to the remainder annex the two figures of the next period for a dividend —Double the root above mentioned for a divisor, and find how often it is contained in the said dividend, exclusive of its right hand figure, and set that quotient figure both in the quotient and divisor —Multiply the whole augmented divisor by this last quotient figure and subtract the product from the said dividend, bringing down the next period of the given number as before, for a new dividend —Repeat the same process for each period, and the number thus obtained will be the root required

NOTES 1 The best way of doubling the root, to form the new divisors, is by adding the last figure to the last divisor

2 The root will necessarily consist of as many integers and decimals as there are periods in each respectively And when the figures of the given number are all exhausted, the operation may be continued at pleasure by adding ciphers, two in each period

Required the square root of 5499025

5499025(2345 the root

464)2090
1856

4685)23425
23425

3 When the root is to be extracted to many places of figures, the work may be considerably shortened, by extracting according to the common method until one more than half the required number of figures in the root be obtained, and then dividing the last remainder by its corresponding divisor, after the manner of the second note in division of decimals

Ex Required the square root of 2, to nine places of figures

2 (1 4142

24 | 100
4 | 96

281 | 400
1 | 281

2824 11900
4 11296

28282 | 60400
2 | 56564

28284) 3836 (1356
1008
160
19
2

Ans 1 41421356 the root required

As this method is generally given without any demonstration, and the reason for dividing is above may not appear evident to many, we shall give the following

Let the proposed number be denoted by N the root of the greatest square contained in it by r, and the difference between r and the true root by d

$$\text{Then } N = r^2 + 2rd + d^2$$
$$\text{Or } N - r^2 = 2rd + d^2,$$

And, by dividing both sides of the equation by $2r$,

$$\frac{N-r^2}{2r} = d + \frac{d^2}{2r}$$

Now as the number of figures in any square cannot exceed double those in its root, and the number in d is less than half that in r, it follows, that the value of $\frac{d^2}{2r}$ will always be fractional, and, therefore, less than unity of the right hand figure of d Hence it may be rejected, and the equation becomes $\frac{N-r^2}{2r} = d$, the rule above

4 The roots of vulgar fractions may be obtained, after reducing them to their lowest terms, either by extracting the root of the numerator and denominator respectively, which is the best way when they are complete powers, or by multiplying the numerator and denominator together, and making the root of the product the numerator to the denominator, or the denominator to the numerator of the given fraction The reason for this operation will appear in the second example

Mixed numbers may either be reduced to improper fractions, or the fractional parts to decimals, and then the root extracted as above

Also, by means of the square root, any root the index of which is some power of 2 may readily be found As the fourth root by two, and the eighth root by three extractions, &c

Ex 1 What is the square root of $\frac{27}{147}$?

$\frac{27}{147} = \frac{9}{49}$ and $\sqrt{\frac{9}{49}} = \frac{3}{7}$, answer

2 Required the square root of $\frac{5}{12}$

$$\sqrt{\frac{5}{12}} = \sqrt{\frac{5\times 12}{12\times 12}} = \sqrt{\frac{60}{144}} = \frac{\sqrt{60}}{12}$$

$$\frac{7\ 7459607}{12} = 6454972 \text{ the required root.}$$

Or $\sqrt{\frac{5}{12}} = \sqrt{\frac{5+5}{12+5}}$ ✓ 00 $\sqrt{6}$c
= 6454972, the same as before

Extraction of the Cube Root

Is the method of finding a number, the cube of which shall be equal to the given number from which it is obtained. As the common rule for this operation is so tedious and difficult to be remembered, we shall only give the following approximating method, which is, perhaps, the simplest, and the best adapted for general use of the kind. This rule was probably derived from Dr Halley's rational formula, as it only differs from it by being rather more commodiously expressed, and was, we believe, first used by Mr James Dodson.

Rule. Find by trials the nearest rational cube to the given number, and call it the assumed cube. Then, as double the assumed cube added to the given number, is to double the given number added to the assumed cube, so is the root of the assumed cube to the required root, nearly. Or, as the first sum is to the difference of the given number and assumed cube, so is the assumed root, to the difference of the roots, nearly.—By taking the cube of the root thus found, for the assumed cube, and repeating the operation, the root will be had to a still greater degree of exactness.

Ex. Required the cube root of 21035 8. By a few trials the root is found to be between 27 and 28. Taking, therefore, 27, its cube is 19683, which is the assumed cube. Then,

19683	21035 8		
2	2		
39366	42071 6		
21035 8	19683		
As 60401 8	61754 6	27	27 6047

the root nearly.

Again, for a second operation, the cube of this root is 21035 318645155823, and the process by the latter method will be

21035 318645 &c

42070 637290	21035 8
21035 8	21035 318645 &c

As 63106 43729 diff 481355 27 6047 the dif 000210834

conseq the root req is 27 604910834

General Extraction of Roots

The following general approximating rule was first given by Dr Hutton, and investigated in his Tracts, vol 1 page 45, &c

Rule. Let N be the given power or number, n the index of the power, A the assumed power, r its root, R the required root of N.

Then, as the sum of $n+1$ times A and $n-1$ times N, is to the sum of $n+1$ times N and $n-1$ times A, so is the assumed root r, to the required root R.

Or, as half the said sum of $n+1$ times A and $n-1$ times N, is to the difference between the given and assumed powers, so is the assumed root r, to the difference between the true and assumed roots; which difference, added or subtracted, as the case requires, gives the true root nearly.

That is, $\overline{n+1}\ A + \overline{n-1}\ N : \overline{n+1}\ N + \overline{n-1}\ A :: r : R$. Or, $\overline{n+1}\ \frac{1}{2}A + \overline{n-1}\ \frac{1}{2}N : A \backsim N :: r : R \backsim r$. Where $\backsim$ denotes the general difference. And the operation may be repeated as often as we please, by using always the last found root for the assumed root, and its nth power for the assumed power A.

Ex. To extract the 5th root of 21035 8

Here it appears that the 5th root is between 7 3 and 7 4. Taking 7 3, its 5th power is 20730 71593. Hence then we have

$N = 21035\ 8,\ r = 7\ 3,\ n = 5,\ \frac{1}{2}\ \overline{n+1} = 3,\ \frac{1}{2}\ \overline{n-1} = 2$
$A = 20730\ 716$

$N - A = 305\ 084$

A = 20730 716	N = 21035 8
3	2
3A = 62192 148	42071 6
2N = 42071 6	

As 104263 7 : 305 084 :: 7 3 : 0 213605

7 3
915252
2135588

104263 7)2227 1132(0213605 the diff
14184   7 3 = r add
3758
630   7 3 1 3605 = R the root
5   true to the last fig

As another good approximating rule, we shall add that discovered by Haros, and which is:

Find the nearest power to the given number, and multiply the difference between it and the given number by double its root for a dividend.—And for a divisor, multiply the nearest power by double the index of its root, and add to or take from the product, as the power is too little or too great, the above difference multiplied by one less than the index. Then the root of the nearest power increased or diminished, as the case may require, by the quotient obtained by the division, will be the true root nearly.

N B Two operations are generally necessary in order to have the answer true to 6 or 7 figures; and the result of the first must always be used as the root in the second.

The algebraic expression of the rule is

$$\sqrt[m]{a^m \pm b} = a \pm \frac{2ab}{2ma^m \pm (m-1)b},$$ and which, when 2 and $m = 3$, become

$$\sqrt{a^2 \pm b} = a \pm \frac{2ab}{4a^2 \pm b},$$ and

$$\sqrt[3]{a^3 \pm b} = a \pm \frac{b}{3a^3 \pm b}$$

Ex 1 Required the 6th root of 2

Here the nearest power being 1, and the difference between it and the given number 1 also, we have, for the first approximation,

$$1 + \frac{2+1+1}{2+6+1+(6-1)1} = 1\ 12 \text{ nearly}$$

Then $2 - 1\ 12^6 = 2 - 1\ 9738227 = 0261773$ the second difference, therefore,

$$1\ 12 + \frac{2+1\ 12+0261773}{(2+6+1\text{'}9738227)+(6-1)+0261773}$$
$$= 1\ 12 + \frac{0586_37152}{23\ 8_16_7589} = 1\ 12 + 002462 = 1\ 122462$$

Answer

2 What is the cube root of 12?

The nearest cube is 8, the root of which is 2, and $12 - 8 = 4$, the difference; hence

$$2 + \frac{2+4}{(3\ 8)+4} = 2 + \frac{8}{28} = 2 + \frac{2}{7} = 2\ 28 \text{ nearly}$$

Then, $12 - 2\ 28^3 = 12 - 11\ 852352 = 147648$,

hence, $2\cdot28 + \frac{2\cdot28+\cdot147648}{(3+11\cdot852352)+\cdot147648} = 2\cdot28 + \frac{\cdot366374}{35\cdot764704} = 2\cdot28 + \cdot0094285 = 2\cdot2894285$, the ans nearly.

Fellowship

Is a particular branch of direct proportion, and is chiefly used for dividing any sum or quantity into any assigned number of parts, in a given proportion to each other. It is usually distinguished into single and double fellowship; the former when the parts are each proportional to one number only, and the latter when they are proportional to more than one number.

Single Fellowship

Rule. As the sum of the numbers which denote the proportion of the shares is to the sum or quantity to be divided, so is each proportional number to its corresponding part.

Proof. The sum of the several parts will be equal to the number divided, when the work is right.

Ex. Three persons A, B, C freighted a ship with 340 tuns of wine, of which, A loaded 110 tuns, B 97, and C the rest. In a storm the seamen were obliged to throw overboard 85 tuns; how much must each person sustain of the loss?

Here 110 + 97 = 207 tuns, loaded by A and B,
therefore 340 − 207 = 133 tuns loaded by C.
Hence as 340 : 85 :: 110
or as 4 : 1 :: 110 : 27½ tuns = A's loss,
and as 4 : 1 :: 97 : 24¼ tuns = B's loss,
also as 4 : 1 :: 133 : 33¼ tuns = C's loss

Sum 85 tuns, the proof.

Double Fellowship

Is principally concerned in the adjustment of effects when both the cause and the time of its operation are to be considered; as when the stocks of partners are the same, but employed for different times; or different, and employed for the same time; or when both stock and time are different.

Rule. Multiply each cause by the time of its operation; and say, as the sum of these products is to the whole effect, so is each particular product, to its proportional part of the effect.

Proof. As in single Fellowship.

Ex. H with a capital of 1000*l*, began trade the first of January, and meeting with success in business took in I as a partner, with a capital of 1500*l*, on the first of March following. Three months after that they admit K as a third partner, who brought into stock 2800*l*. After trading together till the end of the year they find there has been gained 1776*l* 10*s*; how must this be divided among the partners?

First { 1000 × 12 = 12000 H's stock and time
1500 × 10 = 15000 I's ditto
2800 × 7 = 19600 K's ditto

46600 sum

	£	s		£	s	d	
Then, as 466	1776	10	120	457	9	4 $\frac{64}{233}$	H's pt
			150	571	16	8 $\frac{80}{233}$	I's do
			196	747	3	11 $\frac{89}{233}$	K's do

Proof £ 1776 10 0

Interest

Of money is the premium paid for the use of a sum, and is by law in this country limited to five per cent per ann.

The interest of 100*l* for a year is called the rate per cent. The sum lent, the principal; and the principal and interest added together, the amount.

Interest is of two kinds, simple and compound.

Simple Interest

Is the premium paid for the use of the first principal only for the whole time, and is, therefore, directly proportional to this principal and the time of its continuance. Hence this

Rule. Multiply the principal by the rate and time successively, and divide by 100, or cut off two figures from the right hand of the pounds, which with the lower denominations, reduced to shillings and pence, will be the answer.

Ex. What is the interest of 945*l* 10*s* for 9 years, at 5 per cent per ann.

$$\frac{\pounds 945\ \ 10s \times 5 \times 9}{100} = 425{,}47\ \ 10 = 425\,l\ 9s\ 6d \text{ ans.}$$

Note 1. When there are certain parts of years in the time, as quarters or months, or days, they may be worked for either by taking the aliquot or like parts of the interest of a year, or by the rule-of-three in the usual way.

Ex. What is the interest of 200 guineas for 4 years 7 months and 25 days, at 4½ per cent per annum?

```
                         ds     l     d
   210            As 365 : 945 :: 25 : l
     4½           or  73 : 945 ::  5 : ·6472
  ------                       5
   840                    -------
   105            73) 47·25 ( ·6472
  ------                345
   945 interest for 1 yr  530
     4                     19

    37 80     ditto 4 years
6mo = ½ 4 725     ditto 6 months
1mo = ⅙   7875    ditto 1 month
          6472    ditto 25 days
   ---------
   l 43·9597
        20
   ---------
   s 19·1940
        12
   ---------
   d  2·3280
         4
   ---------
   q  1·3120                  Ans 43l 19s 2¼d
```

2. The rules for simple interest serve also for the calculation of insurance, the purchasing of stocks, or any thing that is rated at so much per cent.

Compound Interest,

Or interest upon interest is, as the latter designation expresses, when the interest, instead of being paid, is added to the principal, and becomes part of an increased capital. This is not allowed by law, though it can be practised without infringing any statute by renewing the bond or instrument and comprising the whole in it, or by lending the interest separately. It is, however, customary to allow compound interest in purchasing annuities, pensions or leases in reversion, &c.

Rules 1. Find the amount of the given principal, for the time of the first payment, by simple

interest, and consider it as a new principal for the second payment, amount of which calculate as before. And so on, through all the payments to the last, always using the last amount as a new principal for the next payment.

2. Find the amount of 1 pound for the time of the first payment, and involve it to the power whose index is denoted by the number of payments. Then that power multiplied by the given principal, will produce the whole amount. From which the principal being subtracted, leaves the compound interest.

NOTE. When the rate per cent. is an aliquot part of 100, take the same part of the principal for the interest, as in the first method below.

Ex. Required the amount of 720*l.* for 4 years, at 5 per cent. per annum.

Here 5 is the 20th of 100, and the interest of 1*l.* for a year is $\frac{1}{20}$ or .05, and its amount 1.05. Therefore,

By the 1st Rule

	£	*s*	*d*	
20)	720	0	0	1st year's principal
	36	0	0	1st year's interest
20)	756	0		2d year's principal
	37	16		2d year's interest
20)	793	16	0	3d year's principal
	39	13	9½	3d year's interest
20)	833	9	9½	4th year's principal
	41	13	5¾	4th year's interest
£	875	3	3¼	the whole amount or answer required

By the 2d Rule

1.05	amount of 1*l.*
1.05	
1.1025	2d power of it
1.1025	ditto
1.21550625	4th power of it
720	
875.1645	
20	
s 3.2900	
12	
d 3.4800	

POSITION

Is a method of resolving certain questions, which do not fall under the direct rules, and consists in attaining the true answer from the assumption of false numbers. It is of two kinds, single and double.

SINGLE POSITION

Has place when the results are proportional to their suppositions, and therefore only one supposition is necessary.

RULE. Assume any number for that required, and perform the operations described in the question with it. Then say, as the result obtained, is to the number assumed, so is the result in the question, to the answer.

Ex. A person, after spending ⅓ and ¼ of his money, has yet remaining 60*l.*, what had he at first?

Suppose he had at first 120*l.*

		Proof	
Now ⅓ of 120 is	40	⅓ of 144 is	48
¼ of it is	30	¼ of 144 is	36
their sum is	70	their sum	84
which taken from	120	taken from	144
leaves	50	leaves 60 as per question.	

Then, 50 : 120 :: 60 : 144, the answer.

DOUBLE POSITION

Is a method of answering questions similar to those in single position, but which have not their results proportional to their positions. It is performed by means of two suppositions of false numbers.

RULE. Assume two numbers and find two results from them, as in single position. Then take the difference between each result and that mentioned in the question, calling them the errors, and observing whether they are too great or too little. Multiply each error by the contrary supposition, and divide the difference of the products by the difference of the errors when they are either both too great or too little, but divide the sum of the products by that of the errors when one of them is too great and the other too little, for the answer.

Or multiply the difference of the assumed numbers by the least error, and divide the product by the sum or difference of the errors as above.

Then the assumed number belonging to the error multiplied by, being increased or diminished by the quotient, as it was too little or too great, will be the number required.

Ex. 1. What number is that which being multiplied by 6, the product increased by 18, and the sum divided by 9, the quotient shall be 20.

By the first method.

Suppose the two numbers 18 and 30. Then,

	First Position		Second Position	Proof
	18	Suppose	30	27
	6	mult	6	6
	108		180	162
	18	add	18	18
	9) 126		9) 198	9) 180
	14	results	22	
	20	true res	20	
	+6	errors unlike		
2d pos	30	mult.	18 1st pos.	
Errors { 2	180		36	
6	36			
sum	8) 216	sum of products		
	27	answer sought.		

2. What number is that which added to its square makes the sum 12?

By the second method.

The errors, found as in the above example, are 18 and 8, both too great, the two suppositions being 5 and 4.

Then, $4-\frac{(5-4)+8}{18-8}=4-\frac{8}{10}=3.2$ answer.

N. B. For the other rules usually included in more comprehensive treatises on arithmetic, and not found in this, see their respective titles.

ARITHMETICAL, something relating to or after the manner of arithmetic

ARITHMETICAL COMPLEMENT, of a logarithm, is what the logarithm wants of 10 00000 &c, and the easiest way to find it is, beginning at the left hand, to subtract every figure from 9, and the last from 10. So, the arithmetical complement of 8 2501396 is 1 7498604 —It is commonly used in trigonometrical calculations, when the first term of a proportion is not radius, in that case, adding all together, the logarithms of the 3d, 2d, and arithmetical complement of the 1st term

ARITHMETICAL MEAN, OR MEDIUM, is the middle term of three quantities in arithmetical progression, and is always equal to half the sum of the extremes

ARITHMETICAL PROGRESSION, is a series of three or more quantities that have all the same common difference as 3, 5, 7, &c which have the common difference 2, and a, $a+d$, $a+2d$, &c which have all the same difference d

In an arithmetical progression, the chief properties are these 1st, The sum of any two terms, is equal to the sum of every other two that are taken at equal distances from the two former, and equal to double the middle term when there is one equally distant between those two. So, in the series 0, 1, 2, 3, 4, 5, 6, &c $0+6=1+5=2+4=$ twice 3 or 6 — 2d, The sum of all the terms of any arithmetical progression, is equal to the sum of as many terms of which each is the arithmetical mean between the extremes, or equal to half the sum of the extremes multiplied by the number of terms. So, the sum of these ten terms 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, is $\frac{0+9}{2}\times 10$, or 9×5, which is 45 and the reason of this will appear by inverting the terms, setting them under the former terms, and adding each two together, which will make double the same series,

thus	0, 1, 2, 3, 4, 5, 6, 7, 8, 9,
inverted	9, 8, 7, 6, 5, 4, 3, 2, 1, 0,
sums	9, 9, 9, 9, 9, 9, 9, 9, 9, 9

where the double series being the same number of 9s, or sum of the extremes, the single series must be the half of that sum — 3d, The last, or any term, of such a series, is equal to the first term, with the product added of the common difference multiplied by 1 less than the number of terms, when the series ascends or increases, or the same product subtracted when the series descends or decreases. So, of the series 1, 2, 3, 4, &c whose common difference is 1, the 50th term is $1+(1\times 49)$, or $1+49$, that is 50, and of the series 50, 49, 48, &c the 50th term is $50-1\times 49$, or $50-49$, which is 1. Also, if a denote the least term,

z the greatest term,
d the common difference,
n the number of the terms,
and s the sum of them all,

then the principal properties are expressed by these equations, viz,

$$z=a+d\,\overline{n-1},$$
$$a=z-d\,\overline{n-1},$$
$$s=\overline{a+z}\,\tfrac{1}{2}n$$
$$s=\overline{z-\tfrac{1}{2}d\,\overline{n-1}}\;n,$$
$$s=\overline{a+\tfrac{1}{2}d\,\overline{n-1}}\;n$$

Moreover, when the first term a, is 0 or nothing, the theorems become $z=d\,\overline{n-1}$

and $s=\frac{1}{2}zn$

See Hutton's and Keith's Arithmetic

ARITHMETICAL PROPORTION, is when the difference between two terms, is equal to the difference between other two terms. So, the four terms, 2, 4, 10, 12, are in arithmetical proportion, because the difference between 2 and 4, which is 2, is equal to the difference between 10 and 12

ARITHMETICAL RATIO, is the same as the difference of two succeeding terms, in an arithmetical series

ARITHMETICAL SCALES, a name given by M de Buffon, in the Mem Acad for 1741, to different progressions of numbers, according to which arithmetical computations might be made. It may pretty safely be asserted that the common decuple scale is a good convenient medium, the numbers expressed being tolerably short and compendious, and no single character representing too large a number. Still, however, it must be observed that the duodecimal scale has many advantages, and some are of opinion that it is the best of all scales which have been yet proposed. See Hutton's Ozanam, vol I p 5, &c and SCALE

ARITHMETICALLY ad (from *arithmetical*) In an arithmetical manner

ARITHMETICIAN s (from *arithmetick*) A master of the art of numbers (*Addis*)

ARITIUM, in ancient geography, a town of Spain, in Lusitania, situated upon the Tagus, north-east of Alisipo

ARIUS, founder of the sect called Arians, was born in Libya, early in the 4th century. He became popular at Alexandria, and was orthodox till his ambitious views were crossed with respect to church preferment, when he broached his opinion against the divinity of the Word: this occasioned such disputes, that the emperor called a council at Nice, in 325, to put an end to them. In this council the opinion of Arius was condemned, and the celebrated confession of faith known by the name of the Nicene Creed was drawn up. Arius was then banished, but was recalled two years after. Several disputes took place between Arius and Athanasius: he at length, however, triumphed over his powerful antagonist, and was readmitted into the church. He was then conducted in triumph by his followers to the great church, but on the way, being pressed by a natural necessity, he retired to a house of convenience, where he died, in 336

ARK, in the scripture language, a kind of vessel, made by the command of God himself, for preserving Noah and his family, together with the several species of animals, from the universal deluge. The ancients inform us, that the Egyptians used barks made of bulrushes on the Nile, and that these barks were of an oblong square figure, and so light as to be carried by a single man. There is great reason to think that Noah's ark was made in the form of these Egyptian boats, but of an infinitely larger size.

There are several difficulties proposed with relation to Noah's ark. One question is, how long time Noah was employed in building it? Interpreters generally believe, that he was an hundred and twenty years; but some allow him only 52 years, some no more than seven or eight, and others still much less. The Mahomedans say he had but two years allowed him for this work. Another question is, what kind of wood is meant by gopher wood? Some think cedar, or box, others cypress, the pine, fir tree, and the turpentine tree. Pelletier prefers the opinion of those who hold the ark made of cedar: his reasons are, the incorruptibility of that wood, the great plenty thereof in Asia, whence Herodotus and Theophrastus relate that the kings of Egypt and Syria built whole fleets of it in lieu of deal; and the common tradition throughout the East imports, that the ark is preserved entire to this day on mount Ararat.

The dimensions of the ark, as delivered by Moses, are three hundred cubits in length, fifty in breadth, and thirty in height; which, compared with the great number of things it was to contain, seem to many to have been too scanty. And hence an argument has been drawn against the authority of the relation. Celsus long ago laughed at it, calling it κιβωτον αλλοκοτον, *the absurd ark*. This difficulty is solved by Buteo and Kircher, who, supposing the common cubit of a foot and a half, prove geometrically, that the ark was abundantly sufficient for all the animals supposed to be lodged therein. The capacity of the ark will be doubled, if we admit, with Cumberland, &c. that the Jewish cubit was 21.888 inches.—Snellius computes the ark to have been above half an acre in area. Cuneus, and others, have also calculated the capacity of the ark.—Dr Arbuthnot computes it to have been 81002 tuns.—Father Lamy says, that it was an hundred and ten feet longer than the church of St Mary at Paris, and sixty-four feet narrower; to which his English translator adds, that it must have been longer than St Paul's church in London, from west to east, broader than that church is high in the inside, and about fifty-four feet in height of our measure.

The things contained in the ark were, besides eight persons of Noah's family, one pair of every species of unclean animals, and seven pair of every species of clean animals, with provisions for them all, during the whole year. The former appears, at first view, almost infinite; but if we come to a calculus, the number of species of animals will be found much smaller than is generally imagined, out of which, in this case, are to be excepted such animals as can live in the water; and bishop Wilkins imagines, that only seventy-two of the quadruped kind needed a place in the ark.

It appears to have been divided into three stories; and it is agreed on, as most probable, that the lowest story was destined for the beasts, the middle for the food, and the upper for the birds, with Noah and his family; each story being subdivided into different apartments, stalls, &c. Though Josephus, Philo, and other commentators, add a kind of fourth story, under all the rest, being, as it were, the hold of the vessel, to contain the ballast and receive the filth and fæces of so many animals.

Drexelius makes three hundred apartments; father Fournier, three hundred and thirty three; the anonymous author of the Questions on Genesis, four hundred; Buteo, Temporarius, Arias Montanus, Wilkins, Lamy, and others, suppose as many partitions as there were different sorts of animals.—Pelletier only makes seventy-two, viz. thirty six for the birds, and as many for the beasts: his reason is, that if we suppose a greater number, as three hundred and thirty three, or four hundred, each of the eight persons in the ark must have had thirty-seven, forty-one, or fifty stalls to attend and cleanse daily, which he thinks impossible. But there is not much in this; to diminish the number of stalls, without a diminution of the animals, is vain; it being, perhaps, more difficult to take care of three hundred animals in seventy-two stalls, than in three hundred.

Buteo computes, that all the animals contained in the ark could not be equal to five hundred horses; he even reduces the whole to the dimensions of fifty-six pair of oxen. Father Lamy enlarges it to sixty four pair, or an hundred and twenty-eight oxen; so that supposing one ox equal to two horses, if the ark had room for two hundred and fifty six horses, there must have been room for all the animals. And the same author demonstrates, that one floor of it would suffice for five hundred horses, allowing nine square feet to a horse.

As to the food in the second story, it is observed by Buteo from Columella, that thirty or forty pounds of hay ordinarily suffices an ox for a day; and that a solid cubit of hay, as usually pressed down in our hay-ricks, weighs about forty pounds; so that a square cubit of hay is more than enough for one ox one day.—Now it appears that the second story contained 150,000 solid cubits, which, divided between two hundred and six oxen, will afford each more hay by two thirds than he can eat in a year.

Bishop Wilkins computes all the carnivorous animals equivalent, as to the bulk of their bodies, and their food, to twenty-seven wolves; and all the rest to two hundred and eighty beeves. For the former he allows the sustenance of 1825 sheep; and for the latter 109,500

cubits of hay all which will be easily contained in the two first stories, and much room to spare —As to the third story, nobody doubts of its being sufficient for the fowls, with Noah, his sons and daughters

Upon the whole, the learned bishop remarks, that of the two, it appears much more difficult to assign a number and bulk of necessary things to answer the capacity of the ark, than to find sufficient room for the several species of animals already known to have been there —This he attributes to the imperfection of our lists of animals, especially those of the unknown parts of the earth, adding that the most expert mathematician, at this day, could not assign the proportions of a vessel better accommodated to the purpose, than is here [illegible] and hence finally concludes, that [illegible] capacity of the ark, which had been [illegible] objection against scripture, ought to [illegible] a confirmation of its divine [illegible] in those ruder ages men, being [illegible] arts and philosophy were more [illegible] vulgar prejudices than now, so that [illegible] been a human invention, it would have [illegible] contrived according to those wild apprehensions which arise from a confused and general [illegible] of things, as much too big, as it has been represented too little '

Ark of the covenant, in scripture, denotes a kind of chest, wherein, by God's command, Exod xxv 16 were kept the two tables of stone, whereon God had engraven the ten commandments, given to Moses on the mount, and held in high veneration among the Hebrews It contained likewise the golden pot that had manna and Aaron's rod, and the tables of the covenant Heb ix 4 The ark was deposited in the holiest place of the tabernacle It was taken by the Philistines, and detained 20, some say 40 years, at Kirjath-jearim, but the people being afflicted with emerods on account of it, returned it with divers presents, and it was afterwards placed in the temple

ARKEL, a district of the united provinces, in the low countries, belonging particularly to that of Holland, comprehending the town and seigniories of Asperia, of Heuchelnam, and some villages and otherwise called the country of Gorkum

ARKI, a town of European Turkey, situated in Bosnia, at the mouth of the river Basna

ARKITES, in ancient geography, the descendants of Canaan, who inhabited the town of Arka or Arca

ARKLOW, a seaport town of Wicklow, in Ireland Lat 52 42 N, Lon 6 5 W

ARKWRIGHT (Sir Richard), an English manufacturer, was originally a barber at Wirksworth, in Derbyshire, which situation he quitted about 1767, and went about the country buying hair At Warrington he got acquainted with one Kay, a clockmaker, and projected with him a machine for spinning cotton, in perfecting of which, they were assisted by Mr Atherton of Liverpool Mr Arkwright afterwards went into partnership with Mr Smalley of Preston, but not succeeding there, they went to Nottingham, and erected a cotton mill, which was worked by horses By this time Mr Arkwright had taken out a patent for his machine, which, however, was set aside in 1785, in the court of King's Bench He afterwards erected works at Crumford, in Derbyshire, and acquired a fortune of near half a million sterling He was knighted on presenting an address to his majesty, in 1786, as high sheriff of the county of Derby, and died at his seat, August 3 1792

ARLANT, a town of France, in the department of Puy de Dome, and chief place of a canton in the district of Ambert, three leagues south of Ambert

ARLE, a river of Denmark, which runs into the north sea, four miles south of Bredstede

ARLEQUIN See Harlequin

ARLES, an ancient town of France, in the department of the Mouths of the Rhone Lat [illegible] N Lon 4 43 E

ARM s (eapm, eopm, Saxon) 1 The limb which reaches from the shoulder to the hand (*Dryden*) 2 The large bough of a tree (*Sidney*) 3 An inlet of water from the sea (*Norris*)

Arm is also used figuratively for power The secular arm is the lay or temporal authority of a secular judge, to which recourse is had for the execution of the sentences passed by ecclesiastical judges The church sheds no blood [illegible] the judges of inquisition, after they have found the person guilty, surrender him to the secular arm The council of Antioch, held in 341, decrees that recourse be had to the secular arm to repress those who refuse obedience to the church for secular arm, they here use exterior power

Arm, in respect of the magnet A loadstone is said to be armed, when it is capped, cased, or set in iron or steel, in order to make it take up the greater weight, and also to distinguish readily its poles See Magnetism

Arm, in the manage A horse is said to arm himself when he presses down his head, and bends his neck so as to rest the branches of the bridle on his brisket, in order to resist the efforts of the bit, and guard his bars and his mouth A horse is said to arm himself with the lips, when he covers his bars with them, and thereby deadens the pressure of the bit, this is common to thick lipped horses, and may be prevented by having a bit-mouth, made with a cannon or scatch-mouth, broader near the banquets than at the place of its pressure, or rest on the bars For arming against the bit, the remedy is to have a wooden ball made, and covered with velvet, or other soft matter to put on his chaul, which will so press him between the jaw-bones, as to prevent his bringing his head so near his chest

Arm of a horse See Fore thigh

Arm's end A due distance A phrase taken from boxing (*Sidney*)

To **Arm** *v a* (*armo*, Lat) 1 To furnish with armour of defence, or weapons of offence (*Pope*) 2 To plate with any thing that may

and strength (*Shakspeare*) 3 To furnish to fit up (*Walton*) 4 To provide against (*Sp*)

To ARM *v n* To take arms, to be fitted with arms (*Shakspeare*)

ARMA DARE, in ancient charters, to make a knight or to give arms We find also, Arma mutare, to change arms, in token of friendship Arma reversata, inverted arms, &c

ARMA in geography, a small province of South America with a town and river of the same name The soil is so fertile, that it produces maize twice a year

ARMADA, a Spanish term signifying a fleet of men of-war The armada which attempted to invade England in the time of queen Elizabeth, is famous in history, it was partly scattered by the wind, and partly subdued by the English fleet, July 30th, 1588 On which occasion a medal was struck with this motto, Afflavit Deus, et dissipantur

ARMADILLA, in Spanish America, denotes a squadron of six or eight men-of-war, each furnished with from twenty-four to fifty pieces of cannon These the king maintains, to prevent foreigners from trading with the Spaniards, and the Indians The vessels of this armadilla have been much talked of under the name of guarda costas

ARMADILLO In natural history See DASYPUS

ARMAGEDDON, a place spoken of in the Revelations xvi 16 which literally signifies the mountain of Megeddon or Megeddo, a city situated in the great plain at the foot of mount Carmel where king Josiah received his mortal wound in the battle against Necho king of Egypt

ARMAGH a county of the province of Ulster, in the north of Ireland, having its principal town of the same name Armagh is the see of an archbishop who is primate of all Ireland Lat 54 27 N Lon 6 34 W

ARMAGNAC a fine province of Guienne in France now forming a part of the department of Gers

ARMAMAR a small town of Portugal, in the province of Beira, and district of Lamago, containing two parishes and about 1300 inhabitants

ARMAMAXI, in antiquity Scythian chariots variously adorned, carried in processions

ARMAMENT *s* (*armamentum*, Lat) A force equipped for war

ARMAMENTARY *s* (*armamentarium*, Lat) An armoury, an arsenal

ARMATURA, (*armatura, harness*) In anatomy, the amnios or internal membrane that surrounds the fetus

ARMATURE, ARMATURA, in a general sense, is the same with what we otherwise call armour Armatura is more particularly used in the ancient military art, for a kind of exercise, performed with missive weapons, as darts, spears, arrows and the like In this sense, armatura stand contradistinguished from palaria; the latter being the exercise of the heavy-armed, the former of the light armed

ARMED in heraldry, is used in respect of beasts and birds of prey, when their teeth, horns, feet, beak, talons, or tusks, are of a different colour from the rest —He bears a cock, or a falcon, armed, or, &c

ARMED CHAIR *s* An elbow chair

ARMED SHIP, a vessel occasionally taken into the service of the government in time of war, and employed to guard some particular coast, or attend on a fleet She is therefore armed and equipped in all respects like a ship of war, and commanded by an officer of the navy

ARMENA, in botany, a name given by Pliny to a kind of wild asparagus

ARMENIA, a large country of Asia, bounded on the W by the river Euphrates on the S by Diarbekr, Curdistan, and Adirbijan on the E by Shirvan, and on the N by Georgia This country was once governed by its own kings, but the Turks and Persians at present possess it between them

ARMENIANS, in respect of religion, a division among the eastern Christians, thus called from Armenia, the country anciently inhabited by them

Some have supposed, that christianity was established in Armenia by the apostle St Bartholomew, but this is certain, that in the beginning of the fourth century, the Armenian Christians were in a very flourishing state

The Armenian church, in the sixteenth century was governed by three patriarchs the chief of whom resided in a monastery at Echmiazin There were other bishops among them who assumed the title of patriarchs without prerogative annexed to it, though, by authority derived from the chief patriarch they were allowed to consecrate bishops, and every third year to make and distribute the holy chrism, or ointment, which is the privilege of the patriarchs alone

The Armenians, since the conquest of their country by Scha Abbas, king of Persia, have had no fixed place of habitation, but are dispersed in divers parts of Persia, Turkey, and Tartary, and even some parts of Europe, particularly Poland —Their chief employment is merchandize, in which they excel —The cardinal de Richelieu, we are told, had a design to make an establishment of them in France, for promoting the commerce of that country And the chancellor Seguier granted them a printing-house at Marseilles

The religion of the Armenians is the Christian of the Eutychian sect that is they own but one nature in Jesus Christ, and when they speak of the hypostatical union, that he is perfect God and perfect man without mixture They have a high esteem for a book they call the Infant Gospel, which treats of the infancy of Jesus, and says that the Virgin Mary being pregnant, her sister Salome accused her of having prostituted herself, to which the Virgin answered, that she needed only to lay her hand on her belly, and she would know how she came to be with child this Salome accordingly did, and fire came out of her belly, which consumed the half of her arm, upon which she acknowledged her fault and drew it back after which it was healed by putting it to the same place

The Armenian clergy consist of patriarchs, archbishops, doctors, secular priests, and monks The secular priests are not allowed to marry a second time, and therefore they take care to choose young healthy wives they maintain themselves and families by following some occupation, insomuch, that they have hardly time to perform their ecclesiastical functions they lie in the churches on the vigils of those days they are obliged to officiate

The Armenians have seven sacraments, baptism confirmation, penance, the eucharist, extreme unction, orders, and matrimony In baptism, the child is plunged three times into the water and the same form of words that is used with us is repeated every time, the priest then puts a small cord made with silk and cotton on the neck of the infant, and anoints his forehead chin stomach arm-pits, hands, and feet, making the sign of the cross on each part When the child is baptized he is carried home by the godfather with the sound of drums and trumpets The women do not go to church till forty days after their delivery, and they observe many Jewish customs

At the communion, to which infants of two or three months old are admitted, the priests give a piece of the consecrated host, soaked in the consecrated wine The elements are covered with a great veil, and placed in a cupboard near the altar, on the side of the gospels When the priest takes the chalice and patten, he is followed by his deacons and sub deacons, with flambeaux and plates of copper furnished with bells in this manner, with a censer before him, he goes in procession round the sanctuary, he then sets them on the altar pronounces the words of consecration, and turns himself to the people, who fall down, kiss the earth and beat their breasts then, after taking it himself, he distributes the host soaked in wine to the people

The Armenians seem to place the chief part of their religion in fastings and abstinences and among the clergy, the higher the degree, the lower they must live, insomuch that it is said the archbishops live on nothing but pulse They consecrate holy water but once a year, at which time every one fills a pot and carries it home, which brings in a considerable revenue to the church

ARMENIAN VERSION, in biblical history, an ancient translation of the Scriptures, for which the church of Armenia, according to the unanimous testimony of the Armenian writers, is indebted to Miesrob, who is said to have finished it in the year 410 The learned are divided in opinion whether this version was taken from the Greek, or from the Syriac version The curious reader may consult Marsh Michaelis, vol ii p 96, &c

ARMENTA, one of the synonymous names of Bos Americanus of Gmelin, an animal which Dr Shaw considers merely as a variety of Bos Taurus

ARME'NTAL Armentine a (*armentalis*, or *armentinus* Lat) Belonging to a drove or herd of cattle

ARMENTIERS, a small handsome town of France, in the department of the North It is about 8 miles NW of Lisle

ARMENTO'SE a (*armentosus*, Lat) Abounding with cattle

A'RMGAUNT a (from *arm* and *gaunt*) Slender as the arm (*Shakspeare*)

A'RMHOLE s (from *arm* and *hole*) The cavity under the shoulder (*Bacon*)

ARMIGER, armour-bearer in modern writers denotes a title of dignity, rendered in English by esquire

ARMI'GEROUS a (from *armiger*, Lat) Bearing arms

ARMILLA (from *armus*, the arm, diprice) The round ligament which confines the tendons of the carpus

ARMILLARY, in a general sense, something consisting of rings or circles From *armilla* a bracelet

ARMILLARY SPHERE an artificial sphere composed of a number of circles of the mundane sphere put together in their natural order, to ease and assist the imagination in conceiving the constitution of the heavens and the motions of the celestial bodies The armillary sphere revolves upon its axis within a silvered horizon which is divided into degrees, and moveable every way upon a brass supporter The other parts are the equinoctial, zodiac, meridian, the two tropics, and the two polar circles

A'RMILLATED a (*armillatus*, Latin) Having bracelets

ARMILUSTRIUM, a Roman feast, in which they sacrificed, armed, while trumpets sounded

A'RMINGS (In a ship) The same with waste clothes

ARMINIANS, a religious sect, or party, which arose in Holland by a separation from the Calvinists They followed the doctrine of Arminius who thinking the doctrines of Calvin, with regard to free-will, predestination and grace, too severe began to express his doubts concerning them in the year 1591, and upon farther enquiry adopted sentiments more nearly resembling those of the Lutherans than of the Calvinists The controversies on this subject became very general after the death of Arminius, in the year 1609 and threatened to involve the United Provinces in civil discord The Arminian tenets gained ground under the mild and favourable treatment of the magistrates of Holland, though in the result of the contest, the Arminians were overpowered and oppressed, and reduced to a state of exile, till after the death of prince Maurice, in 1625 The Arminian system has very much prevailed in England since the time of archbishop Laud, and its votaries in other countries are very numerous

The distinguishing tenets of the Arminians may be comprised in the following five articles, relating to predestination, universal redemption, the corruption of man, conversion, and perseverance With respect to the first, they maintained, "That God, from all eternity,

mined to bestow salvation on those, who, he foresaw, would persevere unto the end in their faith in Christ Jesus, and to inflict everlasting punishments on those who should continue in their unbelief, and resist, unto the end, his divine succours so that election was conditional, and reprobation in like manner the result of foreseen infidelity, and persevering wickedness "

On the second, the Arminians taught, "That Jesus Christ, by his sufferings and death, made an atonement for the sins of all mankind in general, and of every individual in particular, that, however, none but those who believe in him can be partakers of this divine benefit

On the third article they held, " That true faith cannot proceed from the exercise of our natural faculties and powers, nor from the force and operation of free will, since man in consequence of his natural corruption, is incapable either of thinking or doing any good thing, and that therefore it is necessary, in order to his conversion and salvation, that he be regenerated and renewed by the operation of the Holy Ghost, which is the gift of God through Jesus Christ

Fourthly, "That this divine grace, or energy of the Holy Ghost, begins and perfects every thing that can be called good in man, and consequently all good works are to be attributed to God alone, that, nevertheless, this grace is offered to all, and does not force men to act against their inclination, but may be resisted, and rendered ineffectual, by the perverse will of the impenitent sinner —Some modern Arminians interpret this and the last article with a greater latitude

Fifthly, " That God gives to the truly faithful, who are regenerated by his grace, the means of preserving themselves in this state,' and though the first Arminians made some doubt with respect to the closing part of this article, their followers uniformly maintain, that the regenerate may lose true justifying faith, forfeit their state of grace, and die in their sins

The modern system of Arminianism likewise extends the limits of the Christian church in such a manner, that Christians of all sects and denominations, papists excepted, may be formed into one religious body, and live together in brotherly love and concord The Arminians are also called Remonstrants, from an humble petition entitled Remonstrance, which in the year 1610 they addressed to the States of Holland Their principal writers are Arminius, Episcopius, Vossius, Grotius, Curcellæus, Limborch, Le Clerc, Wetstein, and many others of more modern date

ARMINIUS (James), a Dutch divine, was born at Oudewater, in 1560 He lost his father in his infancy, and his mother, sister, and brothers, were butchered by the Spaniards while he was at Marpurg, in 1575 He afterwards studied at Leyden and Geneva, from whence he travelled into Italy, and spent some time at Padua In 1588 he was ordained, and soon became a popular preacher About this time Lydius, theological professor at Franeker, desired him to refute a piece which had been written against Beza on predestination, by some divines at Delft In studying this point Arminius became a convert to the opinion which he was employed to confute In 1603 he was appointed professor of divinity at Leyden, where his lectures made a great noise, and brought off many from the rigid doctrines which had hitherto prevailed on the divine decrees His great adversary was Gomarus, with whom he held several conferences In 1607 he wrote an admirable apology to the elector palatine, respecting the disputes in which he was then engaged on the controverted points It is supposed that these fierce dissensions occasioned the illness of which he died, in 1609

Arminius was esteemed an excellent preacher his voice was low, but very agreeable, and his pronunciation admirable he was easy and affable to persons of all ranks and facetious in his conversation amongst his friends His great desire was, that Christians would bear with one another in all controversies which did not affect the fundamentals of their religion, and when they persecuted each other for points of indifference, it gave him the utmost dissatisfaction The curators of the university of Leyden had so great a regard for him, that they settled a pension upon his wife and children

He left several works, viz 1 Disputationes de diversis Christianæ religionis capitibus 2 Orationes, itemque tractatus insigniores aliquot 3 Examen modesti libelli Gulielmi Perkinsii de prædestinationis modo et ordine, itemque de amplitudine gratiæ divinæ 4 Analysis capitis noni ad Romanos 5 Dissertatio de vero et genuino sensu capitis septimi epistolæ ad Romanos 6 Amica collatio cum D Francisco Junio de prædestinatione per literas habita 7 Epistola ad Hippolytum a collibus

ARMI'POTENCE s (from *arma* and *potentia*, Lat) Power in war

ARMI'POTENT a (*armipotens*, Latin) Powerful in arms, mighty in war (*Dryden*)

A'RMISTICE s (*armistitium*, Lat) A short truce

A'RMLET s (from *arm*) 1 A little arm 2 A piece of armour for the arm 3 A bracelet for the arm (*Donne*)

ARMOISIN, a silk stuff, or kind of taffety, manufactured in the East Indies, also at Lyons, and at Lucca

ARMONI'ACK s (erroneously so written for *ammoniack*) A sort of volatile salt See AMMONIACK

ARMONICA, (from *ἁρμονια*, *harmony*,) is a name which Dr Franklin has given to a musical instrument constructed with drinking-glasses It is well known, that a drinking-glass yields a sweet tone, by passing a wet finger round its brim Mr Puckeridge, of Ireland, was the first who thought of playing tunes formed of these tones He collected a number of glasses of different sizes, fixed them near each other on a table, and tuned them by

putting into them water, more or less, as each note required Mr Delaval, F R S made an instrument in imitation of that which was contrived by Mr Puckeridge, and from this instrument, Dr Franklin took the hint of constructing his armonica

The glasses for this musical instrument are blown as near as possible in the form of hemispheres, having each an open neck or socket in the middle The thickness of the glass near the brim is about one tenth of an inch, increasing towards the neck, which in the largest glasses is about an inch deep, and an inch and a half wide within, but these dimensions lessen, as the size of the glasses diminishes, only observing that the neck of the smallest should not be shorter than half an inch, The diameter of the largest glass is nine inches, and that of the smallest three inches between these there are twenty-three different sizes, differing from each other a quarter of an inch in diameter For making a single instrument, there should be at least six glasses blown of each size, and out of these, thirty seven glasses (which are sufficient for three octaves with all the semitones) may be found, that will either yield the note required, or one a little sharper, and fitting so well into each other, as to taper regularly from the largest to the smallest The glasses being chosen, and the note for which each glass is intended being marked upon it with a diamond, they are to be tuned by diminishing the thickness of those that are too sharp, which is done by grinding them round from the neck towards the brim, comparing, by means of a well tuned harpsichord, the tone drawn from the glass by your finger, with the note you want, as sounded by the corresponding string of the harpsichord The largest glass in the instrument is G, a little below the reach of a common voice, and the highest G, including three complete octaves and they are distinguished by painting the apparent parts of the glasses withinside, every semitone white, and the other notes of the octave with the seven prismatic colours, so that glasses of the same colour (the white excepted) are always octaves to each other

When the glasses are tuned they are to be fixed on a round spindle of hard iron, an inch in diameter at the thickest end, and tapering to a quarter of an inch at the smallest For this purpose, the neck of each glass is fitted with a cork, projecting a little without the neck, these corks are perforated with holes of different diameters, according to the dimension of the spindle in that part of it where they are to be fixed The glasses are all placed within one another, the largest on the biggest end of the spindle, with the neck outwards, the next in size is put into the other, leaving about an inch of its brim above the brim of the first, and the others are put on in the same order From these exposed parts of each glass, the tone is drawn, by laying a finger upon one of them, as the spindle and glasses turn round The spindle thus prepared, is fixed horizontally in the middle of a box, and made to turn on brass gudgeons at each end A square shank comes from its thickest end through the box, on which shank a wheel is fixed by a screw this will serve, like a fly, to make the motion equable, when the spindle is turned by the foot like a spinning wheel The wheel is eighteen inches in diameter, and conceals near its circumference about twenty-five pounds of lead, and may be made of mahogany An ivory pin is fixed in the face of the wheel, about four inches from the axis, over which is put the loop of the string that comes up from the moveable step to give it motion The box is about three feet long eleven inches wide at the biggest end, and five inches at the smallest end it is made with a lid, which opens at the middle of its height, and turns up by back-hinges The instrument, thus completed, stands on a neat frame with four legs This instrument is played upon by sitting before it, as before the keys of a harpsichord, turning the spindle with the foot, and wetting the glasses now and then with a spunge and clean water The fingers should be first soaked in water and rubbed occasionally with fine chalk, to make them catch the glass, and bring out the tone more readily Different parts may be played together, by using both hands, and the tones are best drawn out, when the glasses turn from the ends of the fingers, not when they turn to them

The advantages of this instrument are, that its tones are incomparably sweet beyond those of any other, that they may be swelled and softened at pleasure, by stronger or weaker pressures of the finger, and continued to any length

ARMORACIA (*Armoracia*, from *Armorica*, the country from whence it was brought) See RAPHANUS RUSTICANUS

A'RMORER s (*armorier*, Fr) 1 He that makes armour, or weapons (*Pope*) 2 He that dresses another in armour (*Shakspeare*)

ARMO'RIAL a (*armorial*, Fr) Belonging to the arms or escutcheons of a family

ARMORICA, the name anciently given to all the northern and western part of Gaul It denotes the same as our word maritime

A'RMORIST s (from *armour*) A person skilled in heraldry

ARMOUR, a defensive habit, wherewith to cover and secure the body from the effects of any offensive weapon In ancient statutes this is frequently called harness A complete armour anciently consisted of a casque or helm, a gorget, cuirass, gantlets, tasses, brassets, cuishes, and covers for the legs, to which the spurs were fastened This they called armour cap a-pie, and was worn by cavaliers and men at arms The infantry had only part of it, viz a pot or head piece a cuirass and tasses; but all of them made light Lastly, the horses themselves had their armour, wherewith to cover the head and neck Of all this furniture of war, scarcely any thing is now retained except the cuirass, the gorget or neckpiece, worn by officers being at present only a badge of honour, and of no defence

ARMOUR, COAT, is the escutcheon of any

person, or family, with its several charges and other furniture, as mantling, crest, supporters, mottoes, &c Thus we say, a gentleman of coat-armour, meaning one who bears arms

A'RMOUR-BEARER s (from *armour* and *bear*) He that carries the armour of another (*Dryden*)

ARMOURER, a maker of arms or armour See ARMORER

ARMOURER OF A SHIP, a person whose office is to take care that the arms be in a condition fit for service

ARMOURY, a store-house of arms, or a place wherein military habiliments are kept, to be ready for use There are armouries in the Tower, and in all arsenals, citadels, castles, &c

ARMOURY is also used for a branch of heraldry, being the knowledge of coat-armours, as to their blazons, and various intendments

A'RMPIT s (from *arm* and *pit*) The hollow place under the shoulder (*Swift*)

ARMS, ARMA, in a general sense, includes all kinds of weapons, whether for defence or offence Nicod derives the word from the Latin phrase quod operiant armos, because they cover the shoulders or sides, but Varro derives arma, ab arcendo, eo quod arceant hostes It is supposed that the first artificial arms were of wood, and were only employed against beasts Arms of stone, and even of brass, appear to have been used before they came to iron and steel Josephus assures us, that the patriarch Joseph first taught the use of iron arms in Egypt, arming the troops of Pharaoh with a casque and buckler The principal arms of the ancient Britons were hatchets, scythes, lances, swords, and bucklers the Saxons, &c brought in the halbert, bow, arrows, arbalets, &c

ARMS (*Arma*) In botany, Mucrones arcentes animalia, ne lædant plantam Thorns, prickles, and stings, with which plants are furnished for their defence Enumerated among the Fulcres See FULCRUM, PRICKLE, STINGS, THORN

ARMS, (*arma*,) in law, are extended to any thing which a man takes in his hand in his wrath, to cast at, or strike another By the common law, it is an offence for persons to go or ride armed with dangerous weapons but gentlemen may wear common armour, according to their quality, &c 3d Inst The king may prohibit force of arms, and punish offenders according to law; and herein every subject is bound to be aiding

Fire-Arms are those charged with powder and ball, such are cannon, mortars, and other ordnance, muskets, carabines, pistols, and even bombs, granadoes, carcasses, &c The pistol was invented at Pistoye a town of Tuscany, and was introduced into England about 1550

ARMS is used figuratively for the profession of a soldier thus we say, he was bred to arms

ARMS, or ARMORIES, are also used in heraldry for marks of dignity and honour, regularly composed of certain figures and colours given or authorised by sovereigns, and borne in banners, shields, coats, &c for the distinction of persons, families, and states, and passing by descent to posterity They were called arms, because they were borne principally on the buckler, cuirass, banners, and other apparatus of war They are also called coats of arms, coat armour, &c because anciently embroidered on sur-coats, &c Some will have the name to have been first occasioned by the ancient knights, who in their justs and tournaments bore certain marks, which were frequently their mistresses favours, in their helmets or shields to distinguish them from each other Arms, at present, follow the nature of titles, which being made hereditary, these are also become so, being the several marks for distinguishing of families and kindreds, as names are of persons and individuals

Arms are distinguished by different names, to denote the causes of their bearing, such as arms of Dominion,—of Pretension,—of Concession,—of Community,—of Patronage,—of Family,—of Alliance,—of Succession

Arms of Dominion, or sovereignty, are those which emperors, kings, and sovereign states do constantly bear, being, as it were, annexed to the territories, kingdoms, and provinces they possess Thus the three lions are the arms of England, the harp those of Ireland &c

Arms of Pretension, are those of such kingdoms, provinces, or territories, to which a prince or lord has some claim, and which he adds to his own, although the said kingdoms or territories be possessed by a foreign prince or other lord Thus the kings of England have quartered the arms of France with their own ever since Edward III laid claim to the kingdom of France, which happened in the year 1330, on account of his being son to Isabella, sister to Charles the Handsome, who died without issue

Arms of Concession, or augmentation of honour, are either entire arms, or else one or more figures, given by princes as a reward for some extraordinary service We read in history that Robert Bruce, king of Scotland allowed the earl of Wintoun's ancestor to bear, in his coat armour, a crown supported by a sword, to show that he, and the clan Seiton, of which he was the head, supported his tottering crown The late queen Anne granted to sir Cloudesley Shovel, rear-admiral of Great Britain a cheveron between two fleurs-de-lis in chief, and a crescent in base, to denote three great victories he had gained, two over the French, and one over the Turks

Arms of Community, are those of bishoprics, cities, universities, academies, societies, companies, and other bodies corporate

Arms of Patronage, are such as governors of provinces, lords of manors, patrons of benefices, &c add to their family arms, as a token of their superiority, rights, and jurisdiction These arms have introduced into heraldry, castles, gates, wheels, ploughs, rakes, harrows, &c

Arms of Family, or paternal arms, are those that belong to one particular family, that di-

stinguish it from others, and which no person is suffered to assume without committing a crime which sovereigns have a right to restrain and punish

Arms of Alliance, are those which families, or private persons, take up and join to their own, to denote the alliances they have contracted by marriage This sort of arms is either impaled, or borne in an escutcheon of pretence, by those who have married heiresses

Arms of Succession, are such as are taken up by them who inherit certain estates, manors, &c either by will, entail, or donation, and which they either impale or quarter with their own arms, which multiplies the titles of some families out of necessity, and not through ostentation, as many imagine

These are the eight classes under which the different sorts of arms are generally ranged, but there is a sort which blazoners call assumptive arms, being such as are taken up by the caprice or fancy of upstarts, though of ever so mean extraction, who, being advanced to a degree of fortune, assume them without a legal title This, indeed is a great abuse of heraldry, and common only in Britain, for on the continent no such practice takes place

Arms, pass of, a combat among the ancient cavaliers

Arms, stand of, contains a musket, a bayonet, sword, belt, and cartridge box

Arms of parade, those used in the ancient tournaments as unshod lances, wooden swords, &c

ARMSTRONG (John), a poet and physician was born at Castleton in Roxburgshire, where his father and brother were ministers He took his degree of M D at Edinburgh, in 1732 In 1735 he published an anonymous tract, entituled, An Essay for abridging the Study of Physic In 1737 appeared his Synopsis of the History and Cure of the Venereal Disease 8vo Not long after came out his Economy of Love, a poem, in which he has caught the spirit of Ovid with his licentiousness In the edition of 1768, the author purged this piece of many offensive passages it is still however so obscene, as to render it impossible to recommend it to general perusal, although it contains many beautiful passages In 1744 he published The Art of preserving Health, one of the best didactic poems in our language In 1746 he was appointed one of the physicians to the military hospital behind Buckingham house In 1758, he printed Sketches or Essays on various Subjects, by Launcelot Temple, esq In 1760 he was appointed physician to the army in Germany, and the next year wrote a poem called Day, in Epistle to John Wilkes of Aylesbury, esq In the letter he threw out a reflection upon Churchill, which drew on him the resentment of that satirist Dr Armstrong published a collection of Miscellanies in 1770, in 2 vols 12mo and the year following, a short Ramble through some Parts of France and Italy, by Launcelot Temple In 1773 appeared his Medical Essays, in 1 vol 4to He died in 1779

ARMUYDEN, a sea-port town of Zealand, one of the Seven United Provinces It was once a flourishing town, but is now inconsiderable, its harbour being stopped up Its salt-works are its chief resource Lat 51 31 N Lon 3 42 E

ARMY, a large number of soldiers, consisting of horse and foot, completely armed, and provided with artillery, ammunition, provision, &c under the command of one general, having lieutenant generals, major generals, brigadiers, and other officers, under him An army is composed of squadrons and battalions, and is usually divided into three corps, and formed into three lines the first line is called the vanguard, the second the main body, and the third the rear guard, or body of reserve The centre is possessed by the foot, the cavalry form the right and left wing of each line, and sometimes they place squadrons of horse in the intervals between the battalions When the army is drawn up in order of battle, the horse are placed at five feet distance from each other, and the foot at three In each line the battalions are distant from each other 180 feet, which is nearly equal to the extent of their front, and the same holds good of the squadrons which are about 300 feet distant, the extent of their own front These intervals are left for the squadrons and battalions of the second line to range themselves against the intervals of the first, that both may more readily march through these spaces to the enemy The first line is usually 300 feet distant from the second, and the second from the third, that there may be sufficient room to rally when the squadrons and battalions are broken

An army sometimes acquires different appellations from the particular service in which it is employed A covering army is that which covers a place, by lying encamped for the protection of the different passes which lead to the principal object of defence An army is said to blockade a place when being well provided with heavy artillery &c it is employed to invest a town for the purpose of reducing it by assault or famine An army of observation is so called because by its advanced positions and desultory movements, it is constantly employed in watching the enemy Such is a body of troops engaged by besiegers to prevent relief being brought into a place, or the siege being raised by the enemy An army of reserve is a sort of general depot for effective service In cases of emergency, the whole, or part of an army of reserve, is employed to recover a lost day, or to secure a victory A flying army is a strong body of horse and foot, usually commanded by a lieutenant-general, which is always in motion, to cover its own garrisons, or to keep the enemy in perpetual alarm

The first standing army that appeared in Europe, after the fall of the Roman legions was that established in France by Charles VII A D 1445 Such an establishment however was so repugnant to the genius of feudal policy and so incompatible with the principles and

pretensions of the nobility, that during several centuries no monarch was either so bold or so powerful as to venture on any step towards introducing it Charles VII under pretence of keeping always on foot a force sufficient to defend the kingdom against any sudden invasion of the English, when he disbanded his other troops, retained under arms a body of 9000 cavalry, and of 16000 infantry

The first standing military force in Britain was that garrison in Dover castle, which by resisting the arms of the dauphin of France, invited by the barons to their succour in their contest with king John, saved the kingdom of England from a foreign dynasty

The regular army established by Charles II consisted at first of little more than 5000 men, including garrisons abroad In 1684 the standing army amounted to 8000 men, that on the Irish establishment having been at the same time augmented to 7000 During the two succeeding reigns the army was much increased, as the nation was engaged in continental war Under Geo I in 1717, the force voted by parliament amounted to 16000 men The standing army was much augmented during the following reign on account of foreign wars and internal disturbances Every successive war has increased the establishment of the army in proportion to our acquisition of foreign territory At the conclusion of the American contest, the forces were reduced to about 40000 men for Great Britain and Ireland and the peace establishment of 1802 consisted of 1[illegible]3,000 men including 17000 cavalry, six regiments of colour in the West Indies amounting to 4[illegible]58 men [illegible] foreign corps of Swiss, &c estimated at 5[illegible]0 See CAVALRY, FENCIBLES, FOOT, GRENADIERS, GUARDS, &c

ARNA, or ARNE, a small territory of Greece, in Thessaly, the name of which, as well as that of its metropolis were derived from Arne the daughter of Eolus, by whose son Bœotus it was built

ARNALL a fortified island on the western coast of the higher peninsula of India, commanding the entrance of the Angis vah or Mandavee river, between Bombay and Surat

ARNDORF, a town of Germany in the circle of Bavaria and principality of Saltzbach, four miles east of Femnat

ARNE (Thomas Augustine), an English musician, was born in 1710 His father was an upholsterer in Covent garden He had his education at Eton, and was afterwards articled to an attorney, but music had more charms for him than the law and he soon abandoned the desk for the fiddle his proficiency was so great, that in no long time he was engaged as leader of the band at Drury-lane, and in 1733 he composed the music for Addison's opera of Rosamond, which was received with universal applause In 1738, he acquired great credit by setting Milton's Comus In 1740 he set Mallet's masque of Alfred in which first appeared the song of Rule Britannia He had great success in composing popular ballads to music In 1759, the university of Oxford conferred on him the degree of doctor of music He died in 1778, of a spasm of the lungs

ARNEHEIM, a town of Guelderland, belonging to the United Provinces. It is an ancient city, and was surrounded by a wall built by Otho IV count of Guelderland Lat 52 2 N Lon 5 50 E

ARNICA In botany, a genus of the class and order syngenesia, polygamia superflua Receptacle naked, down simple, calyx equal, florets of the margin generally with five filaments destitute of anthers Twenty four species chiefly natives of the Alps and the Cape (The name is Greek, $\alpha\rho\nu\iota\kappa\alpha$, from $\alpha\rho\nu$, *a lamb*, because of the likeness of the leaf of this plant to the coat of the lamb) The Doronicum germanicum Mountain arnica Arnica montana of Linn Arnica foliis ovatis integris, caulinis geminis oppositis, constitutes an article in various pharmacopœias The flowers of this plant are very generally employed on the continent Of the advantages derived from their use in paralytic and other affections depending upon a want of nervous energy, there are several proofs, and their extraordinary virtues as a febrifuge and antiseptic, have been highly extolled Much caution is necessary in regulating the dose, as it is a medicine very apt to produce vomiting and much uneasiness of the stomach

ARNICA MONTANA The systematic name for the arnica of the pharmacopœias See ARNICA

ARNICA SUEDENSIS See CONYZA MEDIA

ARNO the most considerable river of Tuscany, in Italy It rises in Florence and falls into the Tuscan Sea, a little below Pisa

ARNOLD of Brescia, in Italy, distinguished himself by being the founder of a sect, which opposed the wealth and power of the Romish clergy He went into France, where he studied under the celebrated Peter Abelard Upon his return to Italy, he put on the habit of a monk, and maintained in his sermons, that the pope and the clergy ought not to enjoy any temporal estate and that those ecclesiastics who had any estates of their own, or held any lands, were entirely cut off from the least hopes of salvation that the clergy ought to subsist upon the alms and voluntary contributions of Christians, and that all other revenues belonged to princes and states, in order to be disposed of amongst the laity, as they thought proper He maintained also several heresies with regard to baptism and the Lord's supper St Bernard has drawn his character in very strong colours Would to God (says he) that his doctrine was as holy as his life is strict would you know what sort of man this is? Arnold of Brescia is a man that neither eats nor drinks, who like the devil, is hungry and thirsty after the blood of souls, who goes to and fro upon the earth, and is always doing among strangers what he cannot do amongst his own countrymen who ranges like a roaring lion, always seeking whom he may devour an enemy to the cross of Christ, an author of discords, an inventor of schisms,

and a disturber of the public peace he is a man, whose conversation has nothing but sweetness, and his doctrine nothing but poison in it, a man who has the head of a dove, and the tail of a scorpion " He engaged a great number of persons in his party, who were distinguished by his name, and proved very formidable to the popes His doctrines rendered him so obnoxious, that he was condemned in the year 1139, in a council of near 1000 prelates, held in the church of St John Lateran at Rome, under pope Innocent II Upon this he left Italy, and retired to Switzerland After the death of that pope, he returned to Italy, and went to Rome where he raised a sedition against pope Eugenius III and afterwards against Hadrian IV who laid the people of Rome under an interdict till they had banished Arnold and his followers This had its desired effect the Romans seized upon the houses which the Arnoldists had fortified, and obliged them to retire to Otricoli in Tuscany, where they were received with the utmost affection by the people who considered Arnold as a prophet However, he was seized some time after by cardinal Gerard, and, notwithstanding the efforts of the viscounts of Campania, who had rescued him he was carried to Rome, and condemned by Peter, the prefect of that city, to be hanged, and was accordingly executed in the year 1155 Thirty of his followers went from France to England, about the year 1160, in order to propagate their doctrine there, but they were immediately seized and destroyed

ARNOLD (Samuel, Mus D) an eminent musical composer, was born in the year 1739, and manifested early indications of those talents for which he was afterwards so celebrated He received his musical education at the Chapel Royal, St James's, and was not long before he distinguished himself by that lively little air "If 'tis joy to wound a lover, a popular piece which was soon followed by others evincing much genius and a correct taste About 1760 he became a regular composer for Covent garden theatre and in 1766 he was appointed to conduct the musical department at the Haymarket theatre In 1767 he made choice of the " Cure of Saul, for the subject of his first effort in the higher style of musical composition This performance was long allowed to be the best in its kind since the time of Handel It was followed by the oratorios of " Abimelech, the " Resurrection, and the " Prodigal Son, the latter of which reflects the highest honour on his judgment and genius In 1773 this gentleman received his doctor's degree at Oxford, and in 1783 was appointed successor to Dr Nares, as organist and composer for the Chapel Royal, St James's In 1796, he succeeded Dr Hayes as conductor of the annual performances at St Paul's for the feast of the sons of the clergy, and in this situation he uniformly maintained his distinguished character, as a musical professor He died on the 22d of October, 1802

The oratorios of Dr Arnold are not unworthy the disciple of so great a master as Handel but such was the versatility of his talents that he distinguished himself equally in those tender, playful, and humorous compositions which furnish so great a portion of our public amusements The " Maid of the Mill,' the ' Agreeable Surprise,' " Inkle and Yarico, the " Shipwreck, " Peeping Tom, and the Shunamite Woman, will continue to delight until the rage for novelty destroys the love of excellence

ARNOLDUS (Gothofredus), pastor and inspector of the churches of Perleberg, and historiographer to the king of Prussia, was born at Annaburg in the mountains of Misnia, in 1666 He was a zealous defender of Pietists, a sect among the German Protestants and composed a great number of religious works, particularly an Ecclesiastical History which exposed him to the resentment of the divines, and another giving an account of the doctrines and manners from the first ages, in which he frequently animadverts upon Cave's Primitive Christianity He died in 1714 Various are the opinions concerning Arnoldus in Germany, some of his own countrymen and profession extolling him to the skies as a saint of the last century, and setting an inestimable value upon his works, while others pronounce damnation upon him as an archheretic, and condemn his writings as heterodox

ARNON, in ancient geography, a rapid river of Palestine, which had its source among the mountains of Gilead, and by its course towards the Red Sea divided the Amorites from the Moabites

ARNOPOGON In botany, a genus of the class and order syngenesia polygamia aequalis Receptacle naked down feathery on a pedicle, calyx one leafed, eight parted turbinate Four species natives of the Cape or South of Europe

ARNOTTO See BIXA

ARNOTTO (*Spanish*) See GALEANA

ARNSHEIM, a town of Germany in the palatinate of the Rhine, eight miles from Creutzenach

AROMA, or SPIRITUS RECTOR, (from ἀρι *intensely*, and ὄζω, *to smell*,) is the odorate principle of plants, or that, whatever it be, to which they owe their smell The term spiritus rector was originally of more extensive signification, having been employed by the ancient chemists to designate the peculiar characteristic of all bodies, or that presiding spirit or aura by which any one body was supposed to be distinguished from every other Its restriction to the order of vegetables was occasioned by the facility which those substances almost exclusively possess, of furnishing the essential oil or peculiar vehicle in which the spirit was supposed to reside, or to which it was indissolubly attached

Of the nature of aroma we know very little being still ignorant whether the powerful scent of a plant be owing to some substance of so delicate a nature as to have eluded our research,

or whether it is only an inherent quality in some known part of the plant, e g the essential oil, which by being volatilized in the air is able to reach our olfactory organs Accordingly chemists have been divided in their opinion whether the difference of odour in plants is to be ascribed to a distinct and peculiar species of aroma existing in each, or to the same principle in different degrees and combinations

The separation of this principle from the plants in which it resides has long been known in the form of essences, distilled waters, or spirits, aromatic waters, &c which are much used in pharmacy, and perfumery, and each of which retains the characteristic scent or odour of the plant from which it is procured

AROMATICAL AROMA'TICK *a* (from *aroma*, Lat spice) 1 Spicy (*Bacon*) 2 Fragrant, strong scented (*Pope*)

AROMATIC VINEGAR, a preparation invented by Mr William Henry, sen of Manchester It is a solution of camphor and various essential oils in the acetic acid or radical vinegar, it possesses a most pungent and agreeable odour, and is extremely useful in preventing the contagion of infectious diseases, and in removing pains in the head, &c

AROMATICS (*aromatica*, αρωματικα from *αρωμα, an odour*) A term applied to all medicines which have a grateful spicy scent, and an agreeable pungent taste, as cinnamon, bark, cardamoms, &c

AROMATIZATION (from *aroma* *ize*) The act of scenting with spices

To AROMATIZE *v a* (from *aroma*, Lat spice) 1 To scent with spices, to impregnate with spices (*Bacon*) 2 To scent, to perfume (*Brown*)

ARONIA in botany See ORONTIUM

ARO ORCHIS See GALENGAL

AROOSSI, a territory of Abyssinia being the southermost division of Maitsha, on the west side of the Nile, inhabited by the Abyssinian, a kindred of the Agows It is bounded on the north by the river Kelu, and on the south by the A

AROPH, a contraction of aroma philosophorum, a name given to saffron Aroph Paracelsi, a kind of chemical flowers elegantly prepared by sublimation from equal quantities of lapis haematitis and sal ammoniac Aroph is also a term used by Paracelsus to denote a medicine said by him to dissolve the stone in the human body, in which sense it is synonymous with lithontriptic

AROSE The preterit of the verb *arise*

ARO'UND *ad* (from *a* and *round*) 1 In a circle (*Dryden*) 2 On every side (*Dry*)

ARO'UND *prep* About, encircling, so as to accompany (*Dryden*)

To AROUSE *v a* (*a* and *rouse*) 1 To wake from sleep (*Shakspeare*) 2 To raise up, to excite (*Thomson*)

AROW *ad* (*a* and *row*) In a row (*S d*)

AROYNT *ad* Begone away (*Shak*)

ARPAGIUS, or HARPAGIUS among the ancients a person who died in the cradle at least in early youth The word is formed from the Greek αρπαζω, *I snatch* The Romans made no funerals for their arpagii They neither burnt their bodies, nor made tombs, monuments, or epitaphs for them In after times, it became the custom to burn such as had lived to the age of 40 days, and had cut any teeth, and these they called Αρπακτοι, or Αρπαγμενοι q d *rapti, ravished*

ARPEGGIO, the manner of making the several notes of a chord in music be distinctly heard one after another, by a melodious purling and rolling motion of the hand, particularly on stringed instruments, always beginning at the ground, or lowest note, and rising gradually upwards this is to imitate harp music

ARPEGGIO ACCOMPANIMENT An accompaniment the passages of which chiefly consist of the intervals of the several chords, taken in succession

ARPENT, signifies an acre or furlong of ground, and according to the old French account in Doom day book, 100 perches make an arpent The most ordinary acre, called l'arpent de France, is 100 perches square but some account it but half an acre

ARPINO, a town of Terra di Lavoro, in Naples Lat 41 44 N Lon 13 40 E

ARPINUM, a city of the Volsci, famous for being the birth place of Marius and Cicero now called Arpino

ARQUEBUSADE *Aqua sclopetaria* (This is a French word from arquebuse a hand-gun and consequently implying good for a gun shot wound) The name of a spirituous water distilled from a farrago of aromatic plants

ARQUEBUSE s A hand-gun (*Bacon*)

ARQUEBUSIER s (from *arquebuse*) A soldier armed with an arquebuse (*Knolles*)

ARRACAN See ARACAN

ARRACHED in heraldry a term applied to the representations of plants torn up by the roots

ARRACK (Indian) 1 Rice —2 A spirituous liquor distilled from rice and drank in the rice countries as we do brandy in this island Its effects on the animal œconomy are the same See BRANDY

ARRAGON, one of the most considerable provinces of Spain, formerly a kingdom It is bounded on the N by the Pyrenees which separate it from France, by Old and New Castile on the W by Valencia on the S and by part of Valencia and Catalonia on the E It is fertile in corn, wine, flax and fruit, and was united in 1478 to the crown of Spain

ARRAGONITE, In oryctology, a genus of the class earths, order calcareous It is thus denominated by Hauy and Brochant, but by Emmerling, Exzentrischer kalkstein It consists of carbonat of lime and phosphoric acid is brittle, hardish, easily frangible, effervesces with acid, when pulverised and spread on hot coals emits a feeble phosphorescent light of a green hue, It appears, hence, to be scarcely more than a species of appatite, which see Yet as Klaproth and Vauquelin, in opposition to Werner, have asserted that its acid is solely carbonic instead of phosphoric, we have in-

troduced it here as a distinct genus. There is but one species, which is found in the province of Arragon in Spain, whence it derives its name, imbedded in gypsum; in fluor spar in the valley of Leogany in Salzburg, and occasionally in France and the Pyrenean mountains. Colour greyish green and pearl-grey, the former passing into mountain-green, the latter into pale violet-blue. Specific gravity 2.9465.

To ARRA'IGN. *v. a.* (*arranger*, Fr. to set in order.) 1. To set a thing in order, or in its place: a prisoner is said to be *arraigned*, when he is brought forth to his trial (*Cowell*). 2. To accuse; to charge with faults in general, as in controversy or in satire (*South*).

ARRAIGNMENT, in law, the arraigning or setting a thing in order, as a person is said to arraign a writ of novel disseisin, who prepares and fits it for trial. The term is most properly used to call a person to answer in form of law upon an indictment, &c. When brought to the bar, the criminal is called upon by name to hold up his hand, which though it may seem a trifling circumstance, yet it is of this importance, that by holding up of his hand constat de persona, and he owns himself to be of that name by which he is called. However, it is not an indispensable ceremony, for being calculated merely for the purpose of identifying the person, any other acknowledgement will answer the purpose as well: therefore if the prisoner obstinately and contemptuously refuses to hold up his hand, but confesses he is the person named, it is fully sufficient. Then the indictment is to be read to him distinctly in the English tongue (which was law even while all other proceedings were in Latin), that he may fully understand his charge. After which it is to be demanded of him, whether he be guilty of the crime whereof he stands indicted, or not guilty? When a criminal is arraigned, he either stands mute, or confesses the fact, or else he pleads to the indictment.—1. If he says nothing, the court ought ex officio to impannel a jury to enquire whether he stands obstinately mute, or whether he be dumb ex visitatione Dei. If the latter appears to be the case, the judges of the court (who are to be of counsel for the prisoner, and to see that he hath law and justice) shall proceed to the trial, and examine all points as if he had pleaded not guilty. But whether judgment of death can be given against such a prisoner, who hath never pleaded, and can say nothing in arrest of judgment, is a point yet undetermined.—If he be found to be obstinately mute (which a prisoner hath been held to be that hath cut out his own tongue,) then, if he be on an indictment of high treason, it hath long been clearly settled, that standing mute is equivalent to a conviction, and he shall receive the same judgment and execution.—The English judgment of penance for standing mute was, till of late years, a species of torture, effected by loading the body of the prisoner with heavy weights till a plea of some kind was drawn from him; but the doubts entertained as to its legality, and the repugnance of its theory to the humanity of the laws of England, concurred to require a legislative abolition of this cruel process, and a restitution of the ancient common law, whereby the standing mute in felony, as well as in treason and in trespass, amounted to a confession of the charge.—2. If the prisoner make a simple and plain confession, the court hath nothing to do but to award judgment: but it is usually very backward in receiving and recording such confession, out of tenderness to the life of the subject, and will generally advise the prisoner to retract it, and,—3. Plead to the indictment, as to which, see the article PLEA OF INDICTMENT.

To ARRA'NGE. *v. a.* (*arranger*, Fr.) To put in the proper order for any purpose (*Cheyne*).

ARRA'NGEMENT. *s.* (from *arrange*.) The act of putting in proper order; the state of being put in order (*Cheyne*).

ARRANGEMENTS (*philosophical*), a title given by the late learned Mr. Harris, of Salisbury, to an excellent commentary on the categories of Aristotle, being as happy a simplification of logic, as his Hermes is of grammar.

A'RRANT. *a.* (from *errant*.) Bad in a high degree (*Dryden*).

A'RRANTLY. *ad.* (from *arrant*.) Corruptly; shamefully (*L'Estrange*).

A'RRAS. *s.* (from *Arras*, a town in Artois.) Tapestry (*Denham*).

ARRA'UGHT. *a.* Seized by violence: out of use (*Spenser*).

ARRA'Y. *s.* (*arroy*, Fr.) 1. Order, chiefly of war (*Milton*). 2. Dress (*Dryden*). 3. [In law.] The ranking or setting forth of a jury impannelled on a cause (*Cowell*).

To ARRA'Y. *v. a.* (*arroyer*, old Fr.) 1. To put in order. 2. To deck; to dress (*Dryden*).

ARRA'YERS. *s.* (from *array*.) Officers who anciently had the care of seeing the soldiers duly appointed in their armour (*Cowell*).

ARRE'AR. *ad.* (*arriere*, Fr.) Behind. The primitive signification, though not now in use (*Spenser*).

ARRE'AR. *s.* That which remains behind unpaid, though due (*Locke*).

ARRE'ARAGE. *s.* The remainder of an account; or, more generally, any money unpaid at the due time (*Cowell*).

ARRENTA'TION (from *arrendar*, Span. to farm.) The licensing an owner of lands in the forest to enclose them.

ARREPTI'TIOUS. *a.* (*arreptus*, Lat.) 1. Snatched away. 2. (from *ad* and *repo*.) Crept in privily.

To ARRE'ST. *v. a.* (*arrester*, Fr.) 1. To seize by a mandate from a court (*Shakspeare*). 2. To seize any thing by law (*Shakspeare*). 3. To seize; to lay hands on (*South*). 4. To withhold; to hinder (*Davies*). 5. To stop motion (*Boyle*).

ARREST. *s.* A mangey humour between the ham and pastern of the hinder legs of a horse.

ARREST, in common law, the apprehending or restraining of one's person, in execution of the command of some court, or officer of

justice The word arrest is French, and is used in that language for a decree or determination of a cause debated to and fro in which sense it seems derived from *ἀρεστον*, *placitum*, the pleasure of the court Hence, when a person is legally stopped, apprehended, and restrained of his liberty, for debt, &c he is said to be arrested, or put under an arrest, which is the beginning of imprisonment None shall be arrested for debt, trespass, &c or other cause of action, but by virtue of a precept or commandment out of some court but for treason, felony, or breach of the peace, a man may arrest without precept or warrant

ARREST OF JUDGMENT, in law, the assigning just reason why judgment should not pass, as, want of notice of the trial a material defect in the pleading, when the record differs from the deed impleaded, when persons are misnamed, where more is given by the verdict than is laid in the declaration, &c This may be done either in criminal or civil cases

ARRESTANDIS BONIS, &c a writ that lies for one whose cattle or goods are taken by another, who is likely to carry them away before the contest is decided

ARRESTO FACTO SUPER BONIS, &c a writ brought by a denizen against the goods of aliens found within this kingdom, as a recompence for goods taken from him in a foreign country

ARRESTMENT, in Scots law, signifies the securing of a criminal till trial, or till he find caution to stand trial, in what are called bailable crimes

ARRHABONARII, a sect of Christians, who held that the eucharist is neither the real flesh or blood of Christ, nor yet the sign of them, but only the pledge or earnest thereof

ARRHENICUM See ARSENICUM

ARRIAN The most eminent of this name was a philosopher of Nicomedia, priest of Ceres and Proserpine, and disciple of Epictetus, called another Xenophon from the elegance and sweetness of his diction, and distinguished for his acquaintance with military and political life He wrote seven books of Alexander's expedition, the Periplus of the Euxine and Red Sea, four books on the dissertations of Epictetus, besides an account of the Alani, Bithynians, and Parthians He flourished about the 140th year of Christ, and was rewarded with the consulship and government of Cappadocia by M Antoninus —A poet who wrote an epic poem in twenty four books on Alexander, also another poem on Attalus, king of Pergamus He likewise translated Virgil's Georgics into Greek verse

ARRI'SION *s* (*arrisio*, Lat) A smiling upon

ARRI'VAL *s* (from *arrive*) The act of coming to any place, and, figuratively, the attainment of any purpose (*Waller*)

ARRI'VANCE *s* (from *arrive*) Company coming not in use (*Shakspeare*)

To ARRI'VE *v n* (*arriver* Fr) 1 To come to any place by water (*Dryden*) 2 To reach any place by travelling (*Sidney*) 3 To reach any point (*Locke*) 4 To gain any thing (*Addison*) 5 To happen (*Waller*)

ARRIUS, a friend of Cicero, whose sumptuous feast Horat describes, 2 sat

ARRIUS, and ARIUS, a philosopher of Alexandria, who so ingratiated himself with Augustus, after the battle of Actium, that the conqueror declared the people of Alexandria owed the preservation of their city to these three causes, because Alexander was their founder, because of the beauty of the situation, and because Arrius was a native of the place

ARRO'DE *v a* To gnaw or nibble

ARROE, a small island of the Baltic sea, belonging to Denmark Lat 55 10 N Lon 10 20 E

ARROGANCE, or ARROGANCY (from *arrogantia*) The act or quality of taking much upon oneself According to Dr Cogan arrogance indicates itself by some particular claims to precedency, or marks of distinction and respect from those whom pride considers its inferiors in station and character, or, by impertinent pretensions to an equality with superiors

A'RROGANT *a* (*arrogans* Lat) Haughty, proud (*Temple*)

A'RROGANTLY *ad* (from *arrogant*) In an arrogant manner (*Dryden*)

A'RROGANTNESS *s* (from *arrogant*) Arrogance

To A'RROGATE *v a* (*arrogo*, Lat) To claim vainly, to exhibit unjust claims (*Ral*)

ARROGA'TION *s* (from *arrogate*) A claiming in a proud unjust manner

ARRONDEE, in heraldry, a cross, the arms of which are composed of sections of a circle not opposite to each other, so as to make the arm bulge out thicker in one part than another, but both the sections of each arm lie the same way so that the arm is every where of an equal thickness and all of them terminating at the edges of the escutcheon, like the plain cross

ARRO'SION *s* (from *arrosus*, Lat) A gnawing

ARROW, a river of Worcestershire and Warwickshire, which runs into the Avon, near Bidford Grange

A'RROW *s* (*a ere*, Sax) The pointed weapon which is shot from a bow (*Hayward*)

ARROW, in fortification, is a work placed at the saliant angles of the glacis, and consists of two parapets each forty toises long The work has a communication with the covertway of about 24 or 30 feet broad, called caponier, and a ditch before it of 5 or 6 toises

Fire Arrows were first used in war by the Persians under Xerxes, who, when encamped on the hill opposite the citadel of Athens, commenced their attack by shooting against the barricade of wood, which the oracle had declared invincible, arrows wrapped in tow, and set fire to The warriors of the middle ages frequently fixed phials of quick lime, or other combustible matter, to their arrow-heads, and shot them from the bow, and in sea-fights they were found particularly effective

ARROWAUKS, in geography, a name given to the ancient natives of Hispaniola, Cuba, Jamaica, Portorico, and Trinidad.

ARROWHEAD. s. (from *arrow* and *head*.) A water plant, whose leaves resemble the head of an arrow. (See SAGITTARIA.) The roots of this plant, sagittaria sagittifolia of Linnæus, are said to be esculent, but it must be in times of very great scarcity.

ARROW HEADED GRASS. See TRIGLOCHIN.

ARROW-ROOT (Indian). See MARANTA.

ARROWS, in surveying, small sticks shod with iron, to stick into the ground at the end of the chain.

ARROWY. *a.* (from *arrow*.) Consisting of arrows. (*Milton.*)

ARRUCI VETUS, in ancient geography, a town of Spain, in Bætica, near the mountains.

ARSACIDÆ, in ancient history, a denomination given to the kings of Parthia, beginning with Arsaces I, the founder of the Parthian monarchy, and terminating with Artabanus, who was put to death by order of Artaxerxes, after the Parthians were subdued by the Persians.

ARSE. s. (earse, Sax.) The buttocks, or hind part of an animal.

ARSE FOOT. s. A kind of water fowl.

ARSE-SMART. s. (*persicaria*, Lat.) A plant. See POLYGONUM.

ARSENAL. s. (*arsenale*, Ital.) A repository of things requisite to war; a magazine of military stores (*Addison*). The principal arsenal in England is that at Woolwich, formerly known by the name of the Warren, where there are immense quantities of great guns, mortars, bombs, balls, powder, and other warlike stores; and where are likewise foundries for casting guns with extensive machinery for boring, turning, and all other operations connected with the construction of artillery and their carriages.

ARSENIATS, neutral salts formed by the combination of arsenical acid with alkalies, earths, and metals. See them particularized in the next article.

ARSENICUM. In oryctology, a genus of the class metals. Bluish white, soon becoming black, and falling to powder in the air; soft, extremely brittle: specific gravity 8.310: subliming without melting in a moderate heat in a white powder, emitting a strong smell resembling garlic: its sublimed oxyd giving an acid taste to water, and turning vegetable blues red; when dissolved in muriatic acid, and a watery solution of sulphurated hydrogen poured on to it, precipitating a fine yellow powder. It contains seven species.

1. A. nativum. Nude or native arsenic, of which there are three varieties.

α Uncombined with metallic lustre, separating into spherical incrustations.

β With micaceous particles.

γ Friable and porous.

Found in Great Britain, various parts of Germany, Norway, Saxony, &c. accompanying spar, baryte, or feldspar, massive, rarely disseminated, often composed of hemispheric layers, corroded, branched, perforated, botryoidal, or stalactitic; colour lead-grey, but its surface soon tarnishing and becoming black by exposure to the air; streak bluish-grey, powder dull and blackish; sometimes a little sonorous when struck against a hard body, and so soft as to be easily cut with a knife. Before the blow-pipe it emits a white smoke, diffusing its peculiar and highly poisonous vapours to a great distance, burning with a blue flame and gradually vanishing, depositing a white oxyd in the form of a powder: specific gravity 5.670 to 5.729; always alloyed with some iron, and often contains some cobalt, bismuth, silver, and sometimes a little gold.

2. A. calciforme. White arsenic. White oxyd of arsenic. White, soluble in eighty times its weight of water. It is found in a loose dust or mealy powder, in a state of crystallization, or in an indurated state combined with earth, in various parts of Great Britain, Germany, Hungary, Saxony, Bohemia, &c. Colour white or grey, with often a tinge of red, yellow, green, or black: before the blow-pipe it sublimes, but does not inflame, and tinge borax green: specific gravity 3,700.

3. A. auripigmentum. Orpiment. Yellow arsenic. Ponderous, yellow, curved, or undulately foliated of a waxy internal lustre, evaporating almost entirely before the blow-pipe. Found in Great Britain, Hungary, Georgia, Turkey, &c.; massive, disseminated, or in small imperfect crystals; colour, various shades of yellow, with a considerable waxy lustre, and some transparency; streak orange-yellow, not metallic; texture foliated, with the plates mostly curved or undulated, rarely striate, a little flexible, but not elastic; effervesces with hot nitric acid: burns with a bluish flame, and before the blow-pipe evaporates, leaving behind a small portion of earth: specific gravity 3.048 to [illegible].

4. A. sandaraca. Red arsenic. Ruby arsenic. Realgar. Somewhat ponderous, red, with an orange yellow streak, in straight foliations, melting easily before the blow-pipe, burning with a blue flame and white arsenical vapours. Found in Sicily, Naples, Hungary, Bohemia, China, Japan, &c. massive, disseminated, superficial, or crystallized in small acute angled, quadrangular, or acicular prisms; colour aurora-red, ruby, scarlet, crimson or blood-red, often variegated with yellow traces; texture lamellar, with the foliations a little flexible, and so soft as to be cut with a knife, and frequently exhibiting a brilliant lustre; streak yellowish red, powder scarlet; in nitric acid it loses its colour: specific gravity 3.338.

5. A. sulphuratum. Marcasite. White mundic. White pyrite. Pyritical arsenical ore. Hard, bluish-grey with metallic lustre; before the blow-pipe emitting white arsenical vapours and blue sulphureous flames. Found in various parts of Great Britain, Germany, Sweden, Bohemia, Saxony, &c. in irregular

masses, disseminated, investing or crystallized in cubes or four-sided prisms, specific gravity 6 522

6 A albicans Misspickel Marcasite Of a steel-white colour and lustre, hard, emitting white arsenical vapours before the blow-pipe, but no sulphureous flame or vapour Found in Cornwall, near Dublin, in Bohemia, Silesia, Saxony, &c generally dispersed among tin ores in granulations, or crystallized in four-sided double pyramids, or four-sided quadrangular prisms colour sometimes silvery, grey, or yellowish, or iridescently variegated when tarnished texture compact, sometimes a little splintery, with the surface marked with decussate grooves or black ramifications, effervesces with nitric acid without heat, and yields an arsenical smell when rubbed It consists of arsenic alloyed with a considerable quantity of iron, but little or no sulphur, specific gravity from 5 753 to 6 522

7 A argentiferum Argentiferous arsenic Of a silvery lustre and very fine granular texture, emitting arsenical vapours before the blow pipe, and when fused with lead leaving a silver bead Found in the mines of Saxony, Bohemia, Germany, and Spain, massive, disseminated, or acicular, colour nearly that of the last, but brighter and more permanent burns with a white flame, and leaves a reddish residuum by solution in nitro-muriatic acid the silver will be precipitated It consists of arsenic, sulphur, iron, and from 1 to 10 or 12 per cent of silver specific gravity 4 087

In the assay and analysis of arsenical ores, the following method by Mr Chevenix is esteemed preferable to any other Reduce the ore to a very fine powder, and digest it in nitric acid sufficient to acidify and take up the whole of the arsenic, pour off the clear liquor, and boil on the residue some distilled water filtre, and add the water to the nitrous solution then neutralize the excess of acid by potash, taking care, however, not to have an excess of alkali, and add nitrate of lead as long as any precipitate takes place wash the precipitate in cold water, dry, and weigh it As the arsenical ores often contain sulphur, it is possible that the arseniat of lead thus procured may be mixed with a little sulphat of lead to decide this, digest the powder in some warm dilute muriatic acid, and the arseniat of lead will be dissolved, leaving the sulphat behind

The arsenic of commerce is not prepared from the direct reduction of the proper ores of this metal, but is obtained in Saxony by roasting the cobalt ores in the manufacture of zaffre These ores consist principally of arsenic cobalt, iron, and a little sulphur, the first and last ingredients are easily separated by roasting, which is performed, not in the open air, but in an oven the flue of which runs horizontally to a considerable distance before it bends upwards The arsenic and sulphur, when liberated, are deposited for the most part in the horizontal flue In this state it is called

Crude arsenic, or *flowers of arsenic*, and the form it assumes is that of a greyish meal, streaked with yellow, which is occasioned by the sulphur uniting with parts of the arsenic, and composing orpiment From the crude arsenic the

White arsenic of commerce is prepared, by mixing the crude with potash or lime, and re-subliming The sulphur and other impurities are thus combined with the alkali, and the white oxide is driven over into a heated receiver, where it melts into a heavy, colourless, transparent glass by exposure to the air for a short time this glass becomes opaque, and resembles in its fracture the finest white china, it is in this state that the white arsenic of commerce is sold in the shops, and kept in our laboratories, and as it is then an oxide of the metal, approaching very nearly to a state of purity, it is not difficult, by separating its oxygen, to reduce it into

Pure metallic arsenic For this purpose the white arsenic is mixed with any of the vegetable or animal expressed oils, till it becomes of the consistence of very soft glazier's putty, and round or oblong pieces of the paste are dropped into a Florence flask, or earthen retort, so as not to adhere to the sides It is then put into a sand bath, or over a gentle charcoal fire, and heated very gradually until it ceases to emit thick vapour when the heat may be increased by degrees to obscure redness Shortly after the vessel may be removed, and when cold broken the neck and upper part will contain a crystallized oxide of arsenic, below, a thick crust of metallic arsenic, and at the bottom some impurities, which must be laid aside The other products are to be pulverized with half their weight of charcoal, and sublimed again as before, by which means the arsenic is rendered pure, and will be found to line the vessel in the form of a shining crust and crystals For the safety of the operator, these processes should be performed under a chimney The principal properties of pure arsenic beside those mentioned in the beginning of this article, are the following —

As it is not perceptibly soluble in water, and is easily tarnished by exposure to the air the best method of preserving it unaltered is to immerse it in water or alcohol With carbon or hydrogen it does not combine, but the latter substance, in the state of gas, dissolves it Oxygen unites with it by combustion, forming arsenical acid With sulphur it may be readily united, forming either realgar or orpiment, according to the proportions of the ingredients or the methods of uniting them these substances are really sulphurets of arsenic, and their properties, with their mode of preparation, when not found native, may [be] found under their names Arsenic combines also readily with phosphorus, f[orming] phosphuret of arsenic, which is black and brilliant, but with azotic gas it has not been united Muriatic acid attacks arsenic only if aided by heat, but, by distilling equal parts of orpiment and corrosive muriate of mercury (corrosive sublimate) in a gentle heat, a blackish corrosive liquor is obtained, which is the sublimat-

ed muriat of arsenic, or butter of arsenic Arsenic combines with most metals, forming with them alloys, and rendering them more fusible and brittle; though such of them as were before very fusible, become refractory. It possesses also the singular property of destroying the magnetic virtue of iron, and of all other metals susceptible of it. The most useful alloys of arsenic are as follow:—1. With platinum, which is formed by fusing that metal and the white oxide of arsenic together. By this means platinum, itself so untractable, may be wrought into the utensils required. The mixture, after fusion, is hammered at a red heat into bars, and the arsenic is gradually driven off. 2. With copper, which is formed by fusing the two metals together in a close crucible, their surface being covered with common salt, to prevent the arsenic from being oxidized by the air. This alloy is white and brittle, and when mixed with a little tin or bismuth is used for a variety of purposes in the arts, when it is known by the names of white copper or white tombac. 3. With iron, which is likewise done by fusion. This alloy, however, is often found native, and is then (as we have already observed) called mispickel. The other metals with which arsenic has been united, are gold, silver, tin, lead, nickel, zinc, antimony, and bismuth. It also forms an amalgam with mercury, by keeping them some hours over the fire, constantly agitating the mixture.

Arsenic is capable of combining with two different proportions of oxygen, by the first is formed the white oxide already described, or

Arsenious acid, as it is denominated by Fourcroy, on account of the many acid properties which it exhibits, by the second is produced

Arsenic or *arsenical acid*, which was discovered in 1775 by Scheele, who also made himself acquainted with its most remarkable properties. There are several methods of preparing this acid, but the following, by Bucholz, is considered as the best. Mix together in a crucible two parts of muriatic acid of the specific gravity 1 2, eight parts of white oxide of arsenic, and 24 parts of nitric acid of the specific gravity 1 25. Evaporate to dryness, and expose the dry mass to a slight-red heat. When first prepared, it exists in a concrete form or dry mass, of a white colour, which has very little taste, but on becoming fluid by deliquescence, or being dissolved in water, it acquires an excessively sour taste. It is as noxious as the white arsenic. Its component parts are about 65 of arsenic to 35 of oxygen, and its specific gravity is 3 391. It is very fixed: in a strong heat it is converted into a glass, which attracts moisture from the air. Six parts of cold water dissolve it slowly, and two parts of boiling water almost instantly. It remains in solution, however, if a considerable portion of that water be evaporated, even so much as to reduce it to a syrup: a further evaporation causes it to deposit crystals. It is not affected by oxygen, or by exposure to the air, the simple combustibles, viz. sulphur, phosphorus, carbon, and hydrogen, decompose it by the assistance of heat, which will also enable several of the metals to decompose it. Combined with alkalies, earths, and several of the metallic oxyds, it forms that class of compound salts which are distinguished by the name of

Arseniat of Potash, formed by saturating the arsenic acid with potash, shoots into large, four-sided, columnar crystals, terminated by quadrilateral pyramids. It is of easy solution in water, permanent in the air, and melts in fire to a glassy substance. With excess of acid, the salt is called, by some,

Super-arseniat of potash, and was long known as the arsenical neutral salt of Macquer, by whom it was discovered, and who formed it by distilling in a retort equal parts of white oxide of arsenic and nitre. Scheele obtained it by adding arsenic acid to the arseniat of potash till the solution ceases to alter the colour of syrup of violets, and then evaporating till four-sided prismatic crystals are formed. This salt is soluble in water, and gives a red colour to vegetable blues.

Arseniat of soda is nearly similar to that of potash, and is produced in the same manner, by saturating soda with the acid.

Arseniat of barytes may be obtained by digesting the acid upon barytes, or, in crystals, by mixing a warm concentrated solution of acetite of barytes and arseniat of potash.

Arseniat of magnesia is formed by digestion, solution in a fresh quantity of acid, and evaporation.

Arseniat of lime is produced by pouring arsenic acid into lime-water.

Arseniat of silver is precipitated by dropping the acid into a solution of nitrat of silver, and that of *mercury* is produced in the same manner. The arsenic acid is also frequently combined with other metallic oxyds, and in consequence gives birth to other arseniats, as

Arseniat of cobalt, for which see COBALTUM.

Arseniat of lead, for which see PLUMBUM.

Arseniat of nickel, for which see NICCOLUM.

Arsenic, and its various preparations, are the most active of all poisons; nevertheless it is a very valuable article in the materia medica, and is very generally used as a tonic in intermittent and hysterical complaints. The following is Dr Fowler's method of preparing it for internal use. Take of powdered arsenic and prepared kali, each 64 grains, boil them gently in a Florentine flask, or other glass vessel, with half a pound of distilled water, until the arsenic is dissolved, to this solution, when cold, add half an ounce of compound spirit of lavender, and as much water as will make the whole equal to a pint, or fifteen ounces and half in weight. The dose of this solution is as follows:—From two years old to four, gut. ij, or iij, to v; from five to seven, gut. v to vij; from eight to twelve, gut. vij to x, from thirteen to eighteen, gut. x to xij, from eighteen

and upwards, gut. xij These doses may be repeated once in eight or twelve hours, diluted with thick gruel or barley-water Arsenic has long been the favourite escharotic amongst quacks who pretend to cure cancer, and it enters into the celebrated Plunket's caustic The following plan should be pursued when arsenic has been swallowed in a quantity sufficient to endanger the life of the person —A vomit of white or blue vitriol should be exhibited immediately, and large quantities of water, in which the hepar sulphuris is dissolved, swallowed The stomach having been thus emptied, a mixture containing the hepar sulphuris, so as to have about a scruple to a dose, should be exhibited frequently, alternating with milk, butter, or castor oil

ARSENIATS, the principal of which are as follow. Macquer discovered this genus of salts, but their nature and composition were first pointed out by Scheele They are known by being precipitated from their solutions, in the form of a yellow powder, by water, holding sulphurated hydrogen gas in solution, or by hydrosulphuret of ammonia

Arseniat of ammonia is produced by saturating liquid ammonia with arsenic acid, and evaporating the mixture until a salt is yielded in rhomboidal crystals, which give a green colour to syrup of violets

Arseniat of copper, a mineral substance, being an ore of that metal in which the arsenic acid is found in a state of natural combination with it There are several species and varieties of this ore, containing different proportions of the ingredients It is found in the copper mines of Cornwall, and is almost peculiar to England See also the article CUPRUM

Arseniat of iron is also found in one of the mines which contain the preceding ore It is sometimes mixed with a small portion of copper, and in this state of double combination of the acid with both metals, it has been called *arsenical copper ore*, or more recently and correctly, *cupreous arseniat of iron* (See FERRUM) These arseniats have been ably examined by the count de Bournon, and by Mr Chenevix, the former of whom, by an arrangement deduced from the principles of crystallography, and the latter by an accurate analysis, have satisfactorily ascertained their nature and composition The ingenious papers of these gentlemen are inserted in the Philosophical Transactions for 1801, and may be found in Tilloch's Philosophical Magazine, vol XII; or in Nicholson's Journal, new series

ARSENICAL *a* (from *arsenick*) Containing arsenick (*Woodward*)

ARSENITES, a term given by Fourcroy to the combinations of white oxide of arsenic, or arsenious acid, with alkalies and earths They were formerly called livers of arsenic

ARSINOE is a name given to several places in Egypt, Cyprus, &c The word is a compound of Arsinoë, Sol's sons, and most places so called are famous for some fountain

ARSIS and THESIS (from the Greek), are terms appropriated to prosody and melody Arsis signifies the elevation of the hand, or that part of the bar, or measure, at which it is raised in beating time Thesis, on the contrary, implies the fall of the hand, or that part of the bar at which it falls Thesis implies the emphatic or accentuated part of the bar, and arsis the weak, or unaccented part

ARSON, in English law, is the malicious and wilful burning of the house or out-house of another man; which is felony at common law This is an offence of very great malignity, and much more pernicious to the public than simple theft, because, first, it is an offence against that right of habitation which is acquired by the law of nature as well as by the laws of society next, because of the terror and confusion that necessarily attend it and, lastly, because in simple theft the thing stolen only changes its master, but still remains *in esse* for the benefit of the public, whereas, by burning, the very substance is absolutely destroyed It is also frequently more destructive than murder itself, of which too it is often the cause

ARSUF, a sea-port town of Palestine, in the Mediterranean, six miles north-east from Joppa

ARSURA, in ancient customs, a term used for the melting of gold and silver, either to refine them, or to examine their value

ARSURA is likewise sometimes used to denote the disease called *erysipelas*

ART *s* (*art*, Fr *ars*, Lat) 1 The power of doing something not taught by nature and instinct (*Pope*) 2 A science as, the liberal arts (*B Jonson*) 3 A trade (*Boyle*) 4 Artfulness, skill, dexterity (*Shaks*) 5 Cunning (*Shaks*) 6 Speculation (*Shaks*)

The above meanings are attached to the word *art*, in Johnson's dictionary abridged as some of these, however, are of great importance, we must enlarge upon them, as below

Art is defined to be a habit of the mind prescribing rules for the due production of certain effects, or the introducing the changes of bodies from some fore-knowledge and design in a person endued with a principle or faculty of acting The word art is derived from ἀρετή, utility, profit; and is found in that sense in Æschylus According to lord Bacon, it is a proper disposition of the things of nature by human thought and experience, so as to make them answer the designs and uses of mankind

Nature, according to lord Bacon, is sometimes free, and at her own disposal, and then she manifests herself in a regular order, as we see in the heavens, plants, animals, &c Sometimes she is irregular and disorderly, either through some uncommon accident, or depravation in matter, when the resistance of some impediment perverts her from her course, as in the production of monsters At other times she is subdued and fashioned by human industry, and made to serve the several purposes of mankind This last is what we call art, in which sense, art stands opposed to nature Hence the knowledge of nature may be divided into the history of generation, of preter-

generation, and of arts. The first considers nature at liberty, the second, her errors, and the third, her restraints

Art is also used for science, or knowledge reduced into practice. Several of the schoolmen hold logic and ethics to be arts, inasmuch as they do not terminate in mere theory, but tend to practice. In this sense some branches of the mathematics also are arts, others, matters of doctrine, or science. Statics is wholly scientifical, as it comprehends the mere contemplation of equilibrium, mechanics, on the contrary, is an art, as it reduces the doctrine of statics into practice

Art is mor

certain system

and inventions or

duly observed, make the things a man undertakes succeed, and render them advantageous and agreeable. In this sense, art is opposed to science, which is a collection of speculative principles and conclusions. According to the foregoing definition, arts may be divided into active and effective; such as leave no external effect after their operation, as dancing, fiddling, &c are called active or practical arts, those which do leave an effect behind them, as painting, &c are called effective arts. Farther, with respect to their scope and object, they may be divided into human, as medicine, and divine, as theology.

Arts (*human*), again, may be subdivided into civil, as law, politics, &c, military, as fortification, &c, physical, as agriculture, chemistry, anatomy, &c, metaphysical, as logic, pure mathematics, &c, philological, as grammar, criticism, &c, mercantile, to which belong the mechanical arts and manufactures. See each in its place

Arts are more properly divided into liberal and mechanical

Arts (*liberal*), are those that are noble, and ingenious, or which are worthy of being cultivated without any immediate regard to the lucre arising from them. Such are poetry, music, painting, grammar, rhetoric, the military art, architecture, and navigation

Arts (*mechanical*), are those, wherein the hand and body are more concerned than the mind, and which are chiefly cultivated for the sake of the profit attending them. Of which kind are most of those which furnish us with the necessaries of life, and are popularly known by the name of trades. Such are weaving, turnery, brewing, masonry, clock-making, carpentry, joinery, foundry, printing, &c

The mechanical arts take their denomination from μηχανη, machine, as being all practised by means of some machine or instrument

With the liberal arts it is otherwise, there being several of them which may be learnt and practised without any instrument at all, as logic, eloquence, medicine properly so called, &c

The arts which relate to the sight and hearing, lord Bacon observes, are reputed liberal, beyond those which regard the other senses, and are chiefly employed in matters of luxury; these are usually called the fine arts; such are poetry, painting, sculpture, music, gardening, and architecture

It has been well noted by philosophers, that, during the rise and growth of states, the military arts chiefly flourish; when arrived at their height, the liberal arts; and when in a declining state, the voluptuary arts.

There are also divers particular arts, as the art of memory, the art of deciphering, the art of swimming, art of diving, &c.

Art and Science are, indeed, words of familiar use, and great significance, but, we fear, little understood. Philosophers have long

scure notion for another. Their attempts have usually terminated in some abstracted definition, which rather casts obscurity than light on the subject, and expresses very little of the essence and obvious phenomena thereof. We have always been pleased with the observations on this subject given in Mr Chambers's excellent Preface to his Cyclopædia, and have, therefore, extracted some of them for the gratification of our readers

To science, says this profound thinker, seem to belong such things as men may discover by the use of sense and reasoning, whatever the mind descries in virtue of that faculty whereby we perceive things, and their relations, is matter of science; such are the laws of nature, the affections of bodies, the rules and criterions of right and wrong, truth and error, the properties of lines and numbers, &c. Science, in effect, is the result of reason and sense, in their general or natural state, as imparted to all men, and not modified, or circumstantiated, by any thing peculiar to the make of a man's mind, the objects he has been conversant among, or the ideas he has present to him. In fine, science is no other than a series of deductions or conclusions, which every person endued with those faculties may, with a proper degree of attention, see and draw: and a science, i e a formed science, is no more than a system of such conclusions, relating to some one subject, orderly and artfully laid down in words. Thus a person who has all the ideas expressed in Euclid's definitions, and sees the immediate connexion of those in his axioms (which no man acquainted with his language can be supposed without), may be said to have it in his power, with attention and industry, to form all the theorems and problems that follow, he has nothing to do but to range those ideas orderly in his mind, compare them together, one by one, in all their changes, and put down the immediate relations observed in the comparison, i e their parity, imparity, &c. And after the relations of each to each are thus got, which make a kind of primary propositions, to proceed to combine them, and take down the relation resulting from a comparison of the several combinations. By such means, without any other helps than penetration and perseverance,

might he make out an infinite number of pi[illegible] [illegible] possibly more than [illegible] [illegible] ing a new relation, i. e. a new prop[illegible] ion, resulting from every new combination.

To ART, on the other hand, belong such things as mere reason could not have attained to; things which lie out of the direct path of deduction, and which require a peculiar cast or turn of mind to see or arrive at. A man might call these the results of particular or personal reason, in opposition to the former, but that such a denomination would be thought unphilosophical. It may, perhaps, be more just to consider reason, here, as modified or tinctured with something in the complexion, humour, or manner of thinking, of the person, or as restrained and diverted out of its proper course, by some views or notices peculiar to him. The difference between the two may be illustrated by that between wit and humour, the former whereof is a general faculty of exciting agreeable and surprising pictures in the imagination; and the latter a particular one the former is pure and absolute in its kind; the latter tinged with something foreign an[d] complexional

An *Art* and a *Science*, therefore, only see[m] to differ as less and more pure a science is [a] system of deductions made by reason alone, undetermined by any thing foreign or extrinsi[c] to itself an art, on the contrary, requires [a] number of data, and postulata, to be furnishe[d] from without, and never goes any length, without, at every turn, needing new ones It is, in one sense, the knowledge and perception of these data that constitutes the art the rest, that is, the doctrinal part, is of the nature of science; which attentive reason alone will descry. An art, in this light, appears to be a portion of science, or general knowledge, considered, not in itself as science, but with relation to its circumstances or appendages In a science, the mind looks directly backwards and forwards to the premises and conclusions in an art we also look laterally to the concomitant circumstances A science, in effect, is that to an art, which a stream running in a direct channel, without regard to any thing but its own progress, is to the same stream turned out of its proper course, and disposed [illegible] cascades, jets, cisterns, ponds, &c In [th]e case the progress of the stream is not [illegible]ed with regard to itself, but only as it [illegible] the works, every one of which modi[fies th]e course of the stream, and leads it out [illegible]y. It is easy to trace the progress of [illegible]er, from its rise to its issue, in regard [illegible]s consequentially; but a man ever so [acq]uainted with this will not be able to [illegible] of the latter, in regard it depends on the genius, humour, and c[illegible] [illegible] [illegible] [illegible] the [illegible]

These are some of the different characters, or [illegible], of art and science; but there is [illegible] between them prior to any of these, [illegible] of which these are only consequences. The [illegible] of them all lies higher in the principle of action, or operation, above specified; namely, as the mind is either active or passive in regard of them. With regard to this, those things may be said to belong to science, which we only see, or perceive; which flow from the nature and constitution of things, by the sole agency of the author thereof; subservient only to his general purposes; exclusive of any immediate agency, or intervention of ours And, on the contrary, those things belong to art, wherein such science or perception is farther modified, and applied by us to particular purposes and occasions of our own From hence arise the several differences abovementioned for the matters of art are only personal, as they are according to the measure of the artist's natural faculties, in respect of quantity and degree; and to the complexion and cast of his moral faculties, in respect of their quality The perception, even of matters of art, is of the nature of science, so that thus far the two agree, and their differences only commence from the superinducing of a further modification in the matter of such perception, and the giving it a new direction to some particular end. By means whereof it becomes invested with a new set of conditions, and circumstances wholly personal, as being all framed and adapted to the particular view and aim of the artist, and conducted according to his particular degree of knowledge and address, which is the effect of a particular set of objects, and a particular organism of body In a word, in art there is a moral view or motive, superadded to the natural science or perception which motive is the proper principle, or primum mobile, of art perception is its matter, and some member of the body is its organ, or instrument And from such new principle, &c arise a new set of secondary perceptions analogous to the natural and primary ones The whole, therefore, ends in this, that science arises from a natural principle, art from a moral one, or even, as moral matters are also, in one sense, natural, science may be said to be of divine original, art of human

ARTS (Progress of the) In all countries where the people are barbarous and illiterate, the progress of arts is extremely slow It is vouched by an old French poem, that the virtues of the loadstone were known in France before anno 1180 The mariner's compass was exhibited at Venice anno 1260, by Paulus Venetus, as his own invention. John Goya of Amalphi was the first who, many years afterward, used it in navigation; and also passed for being the inventor Though it was used in China for navigation long before it was known in Europe, yet to this day it is not so perfect as in Europe. Instead of suspending it in order to make it act freely, it is placed upon a bed of sand, by which every motion of the ship disturbs its operation. Hand-mills, termed querns, were early used for grinding corn; and when corn came to be raised in greater quantity, horse-mills succeeded. Water-mills for grinding corn are described by Vitruvius Wind-mills were known in Greece and in Arabia as early as the seventh century,

and yet no mention is made of them in Italy till the fourteenth. That they were not known in England in the reign of Henry VIII. appears from a houshold book of an earl of Northumberland, contemporary with that king, stating an allowance for three mill-horses, "two to draw in the mill, and one to carry stuff to the mill and fro" Water-mills for corn must in England have been of a later date. The ancients had mirror-glasses, and employed glass to imitate crystal vases and goblets yet they never thought of using it in windows. In the 13th century, the Venetians were the only people who had the art of making crystal glass for mirrors A clock that strikes the hours was unknown in Europe till the end of the 12th century And hence the custom of employing men to proclaim the hours during night, which to this day continues in Germany, Flanders, and England. Galileo was the first who conceived an idea that a pendulum might be useful for measuring time, and Huygens was the first who put the idea in execution, by making a pendulum clock Hooke, in the year 1660, invented a spiral spring for a watch, though a watch was far from being a new invention Paper was made no earlier than the 14th century; and the invention of printing was a century later Silk manufactures were long established in Greece before silk-worms were introduced there The manufacturers were provided with raw silk from Persia but that commerce being frequently interrupted by war, two monks, in the reign of Justinian, brought eggs of the silk-worm from Hindostan, and taught their countrymen the method of managing them —The art of reading made a very slow progress To encourage that art in England, the capital punishment for murder was remitted if the criminal could but read, which in law-language is termed benefit of clergy One would imagine that the art must have made a very rapid progress when so greatly favoured: but there is a signal proof of the contrary, for so small an edition of the Bible as 600 copies, translated into English in the reign of Henry VIII was not wholly sold off in three years. The people of England must have been profoundly ignorant in queen Elizabeth's time, when a forged clause added to the 20th article of the English creed passed unnoticed till about forty years ago

The discoveries of the Portuguese on the west coast of Africa is a remarkable instance of the slow progress of arts In the beginning of the 15th century, they were totally ignorant of that coast beyond cape Non, 28 deg north latitude In 1410 the celebrated prince Henry of Portugal fitted out a fleet for discoveries, which proceeded along the coast to cape Bojadore in 26 deg. but had not courage to double it In 1418 Tristan Vaz discovered the island Porto Santo; and the year after, the island Madeira was discovered In 1439 a Portuguese captain doubled cape Bojadore, and the next year the Portuguese reached cape Blanco, lat 20. deg In 1446 Nuna Tristan doubled cape Verd, lat. 14 40. In 1448 don Gonzallo Vallo took possession of the Azores In 1460 the islands of cape Verd were discovered for don Henry In 1471 Pedro d'Escovar discovered the island St. Thomas and Prince's island. In 1484 Diego Cam discovered the kingdom of Congo In 1486 Bartholomew Diaz, employed by John II. of Portugal, doubled the Cape of Good Hope, which he called Carbo Tormentoso, from the tempestuous weather he found in the passage.

The circumstances which tend most to accelerate the progress of the arts, are, the exertion of national spirit upon any particular art, which promotes activity in the prosecution of other arts;—the patronage of the opulent and the noble;—the rousing a people out of a torpid state by the occurrence of an important series of events;—emulation between neighbouring nations,—and by no means least among these, a struggle for liberty, the resisting a powerful invader, &c Thus Greece divided into small states, frequently at war with each other, advanced literature and the fine arts to unrivalled perfection The Corsicans, while engaged in a perilous war for defence of their liberties, exerted a vigorous national spirit they founded a university for arts and sciences, a public library, and a public bank After a long stupor during the dark ages, arts and literature revived among the turbulent states of Italy The Royal Society in London, and the Academy of Sciences in Paris, were both of them instituted after civil wars that had animated the people and roused their activity.

Useful Arts will never be neglected in a country where there is any police; for every man finds his account in them. Fine arts are more precarious. They are not relished but by persons of taste, who are rare, and such as can spare great sums for supporting them, are still more rare For that reason they will never flourish in any country, unless patronised by the sovereign, or by men of power and opulence They merit such patronage, as one of the springs of government; and a capital spring they make, by multiplying amusements, and humanizing manners, upon which account they have always been encouraged by good princes.

General Theory of the Polite Arts The essence of the polite arts consists in expression. The end of all these arts is pleasure, whereas the end of the sciences is instruction and utility Some of the polite arts indeed, as eloquence, poetry, and architecture, are frequently applied to objects that are useful, or exercised in matters that are instructive, as we shall shew more particularly in their proper place, but in these cases, though the ground-work belongs to those sciences which employ the understanding, yet the expression arises from the inventive faculty. It is a picture that is designed by Minerva, to which the muses add the colouring, and the Graces the frame. This union forms therefore the perfection of the art, according to that sententious and well-

known precept of Horace: Omne tulit punctum qui miscuit utile dulci.

Under the denomination, therefore, of Polite Arts, we comprehend, 1. Eloquence; 2. Poetry; 3. Music; 4. Painting; 5. Sculpture; 6. Graving; 7. Architecture; 8. Declamation; 9. Dancing. Particular descriptions of these arts are given under their respective names. This branch of the present article is intended as a general introduction to them.

There is one very essential reflection, which it appears to us proper to make in the first place, on the polite arts in general. All the rules in the world are not sufficient to make a great poet, an able orator, or an excellent artist; because the quality, necessary to form these, depends on the natural disposition, the fire of genius, which no human art can confer, but which is the pure gift of Heaven. The rules, however, will prevent a man from being a bad artist, a dull orator, or a wretched poet, seeing they are the reflections of the greatest masters in those arts, and that they point out the rocks which the artist should shun in the exercise of his talents. They are of use, moreover, in facilitating his labours, and in directing him to arrive by the shortest and surest road to perfection. They refine, strengthen, and confirm his taste. Nature, abandoned to herself, has constantly something wild and savage. Art, founded on just and sagacious rules, gives her elegance, dignity, and polish; and it is impossible to sacrifice properly to the graces, without knowing the incense that is pleasing to them.

Beauty is the object of all the polite arts. It is not however so easy, as it may seem, to give a clear and determinate idea of what we precisely mean by that term. Many able writers, who have treated expressly on the subject, have shewn that they were totally ignorant of what it was. It is one of those expressions that we comprehend immediately, that present us with a clear and precise idea, that leave a distinct impression on our minds, when it is simply written or pronounced; but which philosophers envelope in darkness, when they attempt to elucidate it by definitions and descriptions; and the more, as mankind have different ideas of beauty, their opinions and tastes being as various as their understandings and physiognomies. We may say, however, in general, that beauty results from the various perfections of which any object is susceptible, and which it actually possesses; and that the perfections which produce beauty consist principally in the agreeable and delightful proportions which are found, 1. Between the several parts of the same object; 2. Between each part and the whole together; 3. Between the parts and the end or design of the object to which they belong. Genius, or invention, is that faculty of the mind by which beauty is produced. Taste, disposition, or rather the natural inclination of the mind refined by art, serves to guide the genius in discerning, embracing, and producing that which is beautiful of every kind. From whence it follows, that the general theory of the polite arts is nothing more than the knowledge of what they contain that is truly beautiful and agreeable; and it is this knowledge, this theory, which modern philosophers call by the Latin name of aesthetica.

It should be constantly remembered, that the essence of the polite arts consists in expression. This expression lies sometimes in the words, and sometimes in the pen, sometimes in sounds and their harmony, and at others in corporeal attitudes, sometimes in the pencil or in the chisel, and at others in the graver, sometimes in a proper disposition or judicious employment of the mechanic arts, and at others merely in their manner of acting. From whence arise those arts that we have mentioned, and which are described in their order.

The general theory of the polite arts, or esthetics, necessarily supposes, therefore, certain rules; but these general rules are of no great number. The first is, that whoever would devote himself to the polite arts, should above all things consult his genius, divest himself of all self-love; and examine if he be a true son of Apollo, and cherished by the muses. For

> In vain, rash author, dost thou strive to climb,
> By lofty verse, Parnassus' height sublime,
> If Heaven do not by secret powers inspire,
> Or if thy natal star dart not poetic fire.

This precept, with regard to poetry in particular, is applicable to all the polite arts in general, for their most happy success is founded on imagination. By this term we understand, in general, a faculty of the mind, a particular genius, a lively invention, a certain subtile spirit, which gives a facility in discovering something new. But it is necessary also to prescribe just bounds to this term new, which must not be here taken in an absolute sense. Solomon wisely remarks, that, even in his time, there was nothing new under the sun. In fact, all that exists, and all that is capable of being discovered in the known world, has already been discovered. The fine arts in their imitations of nature, in their expressions, can borrow images, figures, comparisons from those things only that exist and are known. As there have been, from the beginning of the world to our days, millions of authors in each of the polite arts, almost all the possible combinations of the various subjects have been produced by their lively imaginations; and when we hear the ignorant part of mankind talk of a work of wit or of art that is entirely new, that offers ideas which were before utterly unknown, that had never entered into the brain of any other man, we should refer such assertions to the class of popular errors; and reflect on those stories we every day hear of certain empirics, who pretend to be alone possessed of marvellous methods of cure by means of simples; as if there were any plant, any stalk of grass that grows in our world, that can have escaped the researches of

botanists. But the novelty, of which we here speak, consists in the ingenious use of combinations of all the various objects of [illegible] that are new, happy, and agreeable, a[illegible] not yet been exhausted, and which appear even to be inexhaustible; and of the use which the artist makes of all new discoveries, which he turns to his advantage by a judicious application. Invention therefore sup[illegible] a considerable fund of preliminary know[illegible] such as is capable of furnishing ideas and images, to form new combinations. But there is no art by which invention itself can be produced, for that, as we have already said, is the gift of Heaven; and it is an endowment which we cannot even make use of whenever we please. We would rather say, therefore, that invention consists in producing, in works of genius, that which is unexpected; an object, a harmony, a perfection, a thought, an expression, of which we had no idea, that we could not foresee, nor hope to find, where the artist has so happily placed it, and where we perceive it with delight. This idea appears applicable to such of the polite arts as affect the mind by the hearing as well as by the sight; and it is a matter that is highly essential.

The second rule is, that every artist ought incessantly to labour in the improvement of his taste, in acquiring that sensible, refined, and clear discernment, by which he will be enabled to distinguish the real beauties in each object, the ornaments that are agreeable to it, and the proportions and relations that subsist among the several parts, and by this faculty he will be regulated in the employment of his natural talents. This labour consists not only in the profound reflections he will make on the properties of objects as they relate to the fine arts, but also in a constant assiduous study of the grand models of beauty.

The third rule, to be observed in the practice of the polite arts, is the imitation of nature. Every object in the universe has its peculiar nature, of which the artist should never lose sight in his manner of treating it. In vain will he otherwise ornament his work with the most refined and most brilliant strokes, for, if nature be not justly imitated, it will for ever remain imperfect. The sublime Homer has sometimes sinned against this rule, for, as the gods have a nature peculiar to themselves, it cannot be a just imitation when we attribute to them passions that are scarce pardonable in mortals, and make them frequently converse in a language that is at once vulgar and ridiculous. It was not to imitate nature, to put into the mouth of a hero, at the moment of a decisive battle, an harangue that must become tedious by its excessive length, and which certainly could not have been heard by the thousandth part of a numerous army. We must however observe, that this imitation of nature, which appears at first view so simple and so easy, is of all things the most difficult in practice; and that it requires a discernment so sagacious, and an expression so happy, as is rarely bestowed on man.

Perspicuity forms the fourth rule of expression. In all the fine arts, in general, an obscure, perplexed, ambiguous, and elaborate expression, is always bad. The true, striking beauty must be manifest, and perceptible to the most ignorant of mankind as well as the most learned. Those are very false or inferior beauties that have occasion for a covering, a kind of veil that may make them appear greater than they really are: true beauty wants no veil, but shines by its native lustre. From the union of the true imitation of nature with perspicuity of expression arises that truth which is so essential in the productions of the fine arts.

In all the polite arts, and in all the subjects they embrace, there must necessarily reign an elevation of sentiment, that expresses each object in the greatest perfection of which it is susceptible, that imitates Nature in her most exalted beauty. This makes the fifth general rule. The design of the fine arts being to excite pleasure by the expression of that which is beautiful, every artist should raise himself above his subject, and, choosing the most favourable light wherein to place it, should there embellish it with the greatest, most noble, and beautiful ornaments, that his own genius can suggest; still, however, observing a strict imitation of nature.

From the observation of these two last rules results the sublime, which is the union of the greatest perspicuity with the strictest truth and most exalted elevation possible. It is necessary to remark here, that the most simple and common subjects are susceptible of a sublime that is agreeable to their nature. An idyl or landscape may be as sublime in their kinds as an epic poem or a history-piece. When Moses begins the book of Genesis with these words, In the beginning, God created the heaven and the earth, or when he tells us, that God said, Let there be light, and there was light; these expressions are sublime in the highest degree, because they are perfectly clear, true, and elevated. Every author should therefore endeavour after the sublime in every subject that he undertakes; and this makes the sixth and last general rule in the practice of the polite arts. But if he cannot attain to this, it is, however, indispensably necessary that he constantly make use of expressions that are noble and refined. Every thing that is low, indecent, or disagreeable, is naturally repugnant to the sublime, and ought to be for ever banished from all works related with the noble and liberal arts.

ART AND PART, is a phrase used in the north of England, and in Scotland. When any one is charged with a crime, they say he is art and part in committing the same; that is, he was concerned both in the contrivance and in the execution of it. See ACCESSORY.

ART VETERINARY, is the present improved state of farriery, as taught at a newly established institution, called the Veterinary College, at Camden town, in the parish of Saint Pancras, where the pupils attend la-

tures upon anatomy, physiology, and medicine, under a professor of eminence, as well as the practical part of the business at the forge and in farriery, till, being properly qualified, they pass the necessary examination before a committee of surgeons, when they receive their diploma, and embark for themselves as veterinary surgeons in the service of the public; or possess the privilege of an immediate appointment in his majesty's service, under the patronage of the commander in chief, at a stipend which does honour to the institution See VETERINARY COLLEGE.

ARTA, or LARTA (the ancient Ambracia) A sea-port town of Lower Albania, in Greece. Lat. 39 28 N. Lon. 21, 20 E

ARTABA, an ancient measure of capacity used by the Persians, Medes, and Egyptians. The Persian artaba is supposed to have contained about 166¼ pounds of wine or water, or 126¼ pounds of wheat The Egyptian artaba contained 133¼ pounds of wine or water, 100 pounds of wheat, or 60 of flour.

ARTACE, the name of a colony established by the Milesians in Phrygia, in the year before Christ 694. Venus had a temple in that place, whence her name Artacia

ARTAXATA, the metropolis of Armenia, and from its foundation the residence of all the Armenian kings This city, as Strabo informs us, was built upon a plain which Hannibal gave to king Artaxas, who made it the capital of Armenia,

ARTAXERXES I. surnamed Longimanus, because one of his hands was longer than the other, was the third son of Xerxes, king of Persia He slew his eldest brother, Darius, on suspicion of his being guilty of the murder of his father, which crime was, in fact, committed by Artabanus, captain of the guards. Artaxerxes then ascended the throne, B C 465, and in his time peace was restored between Persia and Athens, after a war of 51 years Artaxerxes is generally supposed to have been the Ahasuerus of scripture, who married Esther, and by whose permission Ezra restored the Jewish religion at Jerusalem The 70 weeks of Daniel are also dated in his reign He died B. C. 424, and was succeeded by his only son, Xerxes. (*Watkins*)

ARTAXERXES II surnamed Mnemon, on account of his extraordinary memory, was the eldest son of Darius Nothus, and began his reign B C. 404 His brother, Cyrus soon after formed a conspiracy against him, for which he was sentenced to death, but at the intercession of his mother, Parysatis, he was banished to Asia Minor. This act of kindness Cyrus repaid by mustering a large army of Asiatics, and hiring some Greek troops, under Clearchus, with which he marched to Babylon, but was met by Artaxerxes, and, after an obstinate battle, defeated; Cyrus himself being numbered with the slain. The Greeks, however, effected a retreat, and returned home safe. This retreat is recorded by Xenophon, and is one of the most brilliant military acts of antiquity. This prince was governed by his mother, who committed horrid barbarities, and at length poisoned the queen, Statira, which roused the resentment of her son, who ordered her to be confined, but afterwards re-admitted her to court, where her power was as great as before. This prince married his own daughter; such was the morality of that age! Artaxerxes died at the age of 94, after reigning 62 years. (*Watkins.*)

ARTAXERXES III succeeded his father, the preceding monarch, B C 359 To pave his way to the succession, he murdered two of his brothers, and after he had gained what he wanted, put to death all the remaining branches of the family. He quelled several insurrections that were raised against him. When in Egypt, he slew the sacred bull, Apis, and gave the flesh to his soldiers, for which his favourite eunuch, Bagoas, who was an Egyptian, caused him to be poisoned, and gave the carcase, cut into small pieces, to the cats, and then made knife-handles of his bones. This happened B C 338.

ARTEDI (John), a Swedish naturalist, was born in 1705, and educated in the university of Upsal He had an ardent passion for all branches of natural history, but he excelled most in that branch of it which is termed ichthyology He contracted a close friendship with the celebrated Linnæus they made each heir to the other's manuscripts in case of death He died at Amsterdam He was going to sup with his friend Seba; and the night being dark, he fell into the canal and perished this happened in 1735 Linnéus published in 1738, his Bibliotheca Ichthyologica, and his Philosophia Ichthyologica But the most valuable edition of Artedi's works was finished in 1792 by Dr Walbaum of Lubeck

ARTE'DIA In botany, a genus of the class and order pentandria digynia. Involucres pennatifid; florets of the centre male, fruit rough with scales. The only known species is a native of mount Libanus

ARTEMIDORUS, famous for his treatise upon Dreams, was born at Ephesus, but took upon him the surname of Daldianus in this book, by way of respect to his mother's country, Daldis. He styled himself the Ephesian in his other performances He not only bought up all that had been written concerning the explication of dreams, which amounted to many volumes; but spent many years in travelling, in order to contract an acquaintance with fortune-tellers: he also carried on an extensive correspondence with all the people of this sort in the cities and assemblies of Greece, Italy, and the most populous islands, collecting at the same time all the old dreams, and the events which are said to have followed them The work which he wrote on dreams consisted of five books: the first three were dedicated to one Cassius Maximus, and the last two to his son, whom he took a good deal of pains to instruct in the nature and interpretation of dreams. This work, though filled with frivolous observations, contains some things that are interesting. It was first print-

ed in Greek, at Venice, in 1518; and Rigaltius published an edition at Paris, in Greek and Latin, in 1603, and added some notes. Artemidorus wrote also a treatise upon Auguries, and another upon Chiromancy, but they are not extant. He lived under the emperor Antoninus Pius.

ARTEMIS, the Greek name of Diana. Her festivals, called Artemisia, were celebrated in several parts of Greece, particularly at Delphi.

ARTEMISIA, wife of Mausolus king of Caria, has immortalised herself by the honours which she paid to the memory of her husband. She built for him in Halicarnassus a very magnificent tomb, called the Mausoleum, which was one of the seven wonders of the world, and from which the title of mausoleum was afterwards given to all tombs remarkable for their grandeur: but she died of regret and sorrow before the Mausoleum was finished. She appointed panegyrics to be made in honour of him, and proposed a prize of great value for the person who should compose the best. He died about the end of the 106th Olympiad, 351 years before the Christian æra.

Artemisia, queen of Caria, and the daughter of Ligdamis, marched in person in the expedition of Xerxes against the Greeks, and performed wonders in the sea-fight near Salamis, 480 years before the Christian æra. Being pursued by an Athenian vessel, she attacked one of the Persian ships, commanded by Demasithymus, king of Calyndus, her enemy, and sunk it, on which the Athenians, thinking that her ship was on the side of the Greeks, ceased their pursuit: but Xerxes was the principal person imposed upon in this affair, for believing she had sunk an Athenian vessel, he declared, that "the men had behaved like women, and the women like men." Xerxes intrusted her with the care of the young princes of Persia, his sons, when, agreeably to her advice, he abandoned Greece, in order to return to Asia. These great qualities did not secure her from the weakness of love: she was passionately fond of a man of Abydos, whose name was Dardanus, and was so enraged at his neglect of her, that she put out his eyes while he was asleep. The gods, in order to punish her for this, inspired her with still a stronger passion for him, so that the oracle having advised her to go to Leucas, which was the usage of desperate lovers, she took the leap from thence, and was interred at that place.—Many writers confound this Artemisia with the former, the wife of Mausolus.

Artemi'sia, in botany, mugwort: a genus of the class and order syngenesia, polygamia superflua. Receptacle naked or villous downless; calyx imbricate, with rounded, connivent scales; florets of the margin subulate, very entire. More than seventy species in different parts of the globe. They may be subdivided into, 1. shrubs or undershrubs, 2. herbaceous with the stem quite simple, and flowers racemed, 3. herbaceous, with stem more or less branched, flowers panicled, leaves compound; 4. more or less shrubby, with branched stem and undivided leaves. The species chiefly entitled to notice are

A. abrotanum. Southernwood. See Abrotanum.

A. absinthium. Wormwood: known officinally by the name of absinthium vulgare; a native of our own country, and employed in medicine as a tonic, stomachic, and anthelmintic. It is also used externally as an antiseptic in fomentations. The Edinburgh Pharmacopœia gives a form for a tincture of its flowers, but the extract of the plant is a more elegant mode of communicating its virtues.

A. judaica, or santonica. Santonicum, which see.

A. maritima. Absinthium maritimum, or sea-wormwood.

A. pontica. Absinthium ponticum, or Euxine wormwood.

A. rupestris. the genipi album of the pharmacopœias. See Genipi album.

A. vulgaris, from the dried tops of which plant the Japanese prepare their moxa. See Moxa.

ARTEMISIUM, either a promontory (Harpocration), or a part of the sea-coast, on the north-east of Eubœa (Plutarch), called Leon, and Cale Acte (Ptolemy), memorable for the first sea-engagement between the Greeks and Xerxes.—Another promontory of Caria (Strabo). A third in Spain, now called cape Martin, in Valencia, in the meridian of London, and lat. 38. 50.

ARTEMIUS, a mountain of Peloponnesus.

ARTE'RIAL. *a.* (from *artery*.) That relates to the artery; that is contained in the artery (*Blackmore*).

ARTE'RIÆ ADIPOSÆ. The arteries which secrete the fat about the kidneys are so called. They are branches of the capsular and diaphragmatic, renal and spermatic arteries.

Arteriæ venosæ. The four pulmonary veins were so called by the ancients.

ARTERIO'SUS DUCTUS. See Ductus arteriosus.

ARTERIO'TOMY (*arteriotomia*, from αρτηρια, *an artery*, and τεμνω, *to cut*.) The opening of an artery. This operation is only performed on the temporal artery.

ARTERY (*arteria*, from αηρ, *air*, and τηρεω, *to keep*, or *contain*, because the ancients believed they carried the finer parts of the blood, mixed with air.) Arteries are membranous pulsating canals, or hollow muscles, which gradually become less in diameter, but more numerous in their ramifications, as they proceed from the heart. They are possessed of three tunics; an elastic or outermost, a muscular or central, and an inelastic or innermost which serves as a lining to the other two. In the larger arteries or those nearest the heart the elastic tunic is stronger than the muscular, by which contrivance the arterial canal is never too largely dilated by the action of the heart in its systole or muscular contraction.

The muscular power or tunic of the arteries, however, increases as they recede from the heart, and ramify into smaller branches, till at length, in the more minute, it is considerably superior to the elastic power; and in the capillaries is almost the only tunic, though perhaps not quite so, that exists. Whence their ease of collapsing; which should seem to proceed from the predominance of the muscular action over the elastic Yet it is probable that in no instance is the collapse altogether perfect, some small elastic power being still continued through the remotest artery, and preventing such an effect, whence in hæmorrhages, their cessation proceeds conjointly from collapse of the mouths of the divided arteries and coagulation of the coagulating lymph of the blood They originate from the heart, the pulmonary artery from the right ventricle, and the aorta from the left the other arteries are all branches of the aorta Their termination is either in small viewless veins, or in capillary exhaling vessels, or they anastomose with one another It is by their means that the blood is carried from the heart to every part of the body, for nutrition, preservation of life, generation of heat, and the secretion of the different fluids The action of the arteries, called the pulse, corresponds with that of the heart, and is effected inversely by the contraction of their muscular, and the elasticity of their middle coats

A Table of the Arteries.

All arteries originate from the pulmonary artery or the aorta.

The pulmonary artery emerges from the right ventricle of the heart and soon divides into a right and left branch, which are distributed by innumerable branches through the lungs

The aorta arises from the left ventricle of the heart, and supplies every part of the body with blood in the following order

a. It first forms an arch;
b It then descends along the spine, and
c It divides into the two iliacs

a The arch of the aorta gives off three branches

I. The arteria innominata, which divides into the right carotid and right subclavian
II. The left carotid.
III The left subclavian

I The carotids are divided into external and internal.

The external carotids give off

1. The thyroid,
2. The lingual,
3. The labial,
4. The inferior pharyngeal,
5 The occipital,
6. The posterior auris,
7. The internal maxillary, from which the spinous artery of the dura mater, the lower maxillary, and several branches about the palate and orbit arise,
8. The temporal

The internal carotid affords

1 The ophthalmic,
2. The middle cerebral,
3. The communicans, which inosculates with the vertebral

II. The subclavians give off the following branches

1 The internal mammary, from which the thymic, comes phrenici, pericardiac, and phrenico-pericardiac arteries arise,
2. The inferior thyroid, which gives off the tracheal, ascending thyroid, and transversalis humeri,
3 The vertebral, which proceeds within the vertebræ, and forms within the cranium the basilary artery, from which the anterior cerebelli, the posterior cerebri, and many branches about the brain are given off,
4 The cervicalis profunda,
5 The cervicalis superficialis,
6 The superior intercostal,
7 The supra-scapular

As soon as the subclavian arrives at the arm-pit, it is called the axillary artery, and when the latter reaches the arm, it is called the brachial.

The axillary artery gives off

1 Four mammary arteries,
2 The sub-scapular,
3 The posterior circumflex,
4 The anterior circumflex which ramify about the shoulder joint

The brachial artery gives off

1. Many lateral branches,
2. The profunda humeri superior,
3 The great anastomosing artery, which ramifies about the elbow-joint,

The brachial artery then divides, about the bend of the arm, into the ulnar and radical arteries, which are ramified to the ends of the fingers

The ulnar artery gives off

1 The several recurrent branches,
2. The common interosseal, of which the dorsal ulnar, the palmaris profunda, the palmary arch, and the digitals are branches

The radial artery gives off

1 The radial recurrent,
2 The superficialis volæ, and then divides into the palmaris profunda and the digitals

b The descending aorta gives off

In the breast,

1 The bronchial,
2 The œsophageal,
3 The intercostals,
4 The inferior diaphragmatic,

Within the abdomen,

1. The cœliac, which divides into three branches.
   1 The hepatic from which are given off, before it reaches the liver,
   a The duodeno-gastric, which sends off the right gastro-epiploic and the pancreatico-duodenal;
   β The pilorica superior hepatica,
   2 The coronaria ventriculi,
   3 The splenic, which unites the great and small pancreatics, the posterior gastric,

the left gastro-epiploic, and the vasa brevia,

2 The superior mesenteric,
3 The emulgents,
4 The spermatics,
5 The inferior mesenteric,
6 The lumbar arteries,
7 The middle sacral

c The aorta then bifurcates into the iliacs, each of which divide into external and internal

The internal iliac, called also hypogastric, gives off

1 The lateral sacrals,
2 The gluteal,
3 The ischiatic,
4 The pudical, from which the external hæmorrhoidal, the perineal, and the arteriæ penis arise,
5 The obturatory

The external iliac gives off, in the groin,

1 The epigastric,
2 The circumflexa iliaca,

It then passes under Poupart's ligament, and is called the femoral artery, and sends off

1 The profunda,
2 The ramus anastomoticus magnus, which runs about the knee joint,

Having reached the ham, where it gives off some small branches, it is termed the popliteal It then divides into the anterior and posterior tibial

The tibialis antica gives off

1 The recurrent,
2 The internal malleolar,
3 The external malleolar,
4 The tarseal,
5 The metatarseal,
6 The dorsales externa halicus

The posterior tibial sends off

1 The nutritia tibiæ,
2 Many small branches,
3 The internal plantar,
4 The external plantar, from which an arch is formed, that gives off the digitals of the toes For the rest, see ANATOMY

A'RTFUL *a* (from *art* and *full*) 1 Performed with art (*Dryden*) 2 Artificial, not natural 3 Cunning, skilful, dexterous (*Pope*)

A'RTFULLY *ad* (from *artful*) With art, skilfully, dexterously (*Rogers*)

A'RTFULNESS *s* (from *artful*) 1 Skill (*Cheyne*) 2 Cunning

ARTHANI'TA (*arthanita*, αρθανιτα, from αρτος, *bread*, because it is the food of swine) The herb sow bread See CYCLAMEN

ARTHRI'TICAL ARTHRI'TICK *a* (from *arthritis*) 1 Gouty, relating to the gout (*Arbuthnot*) 2 Relating to joints (*Brown*).

ARTHRI'TIS (*arthritis*, from αρθρον, *a joint*) The gout A disease arranged by Cullen in the class pyrexia, and order phlegmasiæ It begins with an excruciating pain in the part, which swells and inflames, induces a high degree of fever, and mostly terminates by resolution or the deposition of a chalky matter The species of this complaint are arthritis regularis, arthritis atonica, arthritis retrograda, and arthritis aberrans

It would nevertheless have been more correct to have denominated this disease by the term podagra, which by the Greeks was exclusively appropriated to the gout, since arthritis and arthritic are terms applied to the gout in common with other diseases that like itself affect the region of the joints

ARTHRO'DIA (*arthrodia*, from αρθροω, to articulate) A species of diarthrosis, or moveable connection of bones, in which the head of one bone is received into the superficial cavity of another, so as to admit of motion in every direction, as the head of the humerus with the glenoid cavity of the scapula

ARTHRODY'NIA (*arthrodynia*, from αρθρον, *a joint*, and οδυνη, *pain*) Chronic pains in the joints, without pyrexia It is one of the terminations of acute rheumatism See RHEUMATISMUS

ARTHROPU'OSIS (*arthropuosis*, αρθροπυωσις, from αρθρον, *a joint*, and πυον, *pus*) A collection of pus in a joint It is, however, frequently applied to other affections, as lumbago psoadica, &c

ARTHUR, the celebrated hero of the Britons, is said to have been the son of Uther Pendragon, king of Britain, and to have been born in 501 His life is a continued scene of wonders It is said that he killed four hundred and seventy Saxons with his own hand in one day, and after having subdued many mighty nations, and instituted the order of the Knights of the Round Table, died A D 542, of wounds which he received in battle The most particular detail of his story and his exploits is that given by Geoffrey of Monmouth but the probable is there so blended with the marvellous and the extravagant, that not only the truth of the whole, but even the reality of Arthur's existence, has been called in question Mr Whitaker, however, has taken much pains to vindicate the existence, and discriminate between the real and the fabulous transactions of the British worthy

ARTICHO'KE See CINARA

ARTICHOKE (French) See CINARA

ARTICHOKE (Jerusalem) Although formerly in estimation for the table, this plant, helianthus tuberosus of Linnéus, is now neglected, it being apt to produce flatulency and dyspepsia

ARTICLE, ARTICULUS, a little part or division of a book, writing, or the like — Aquinas divides his sum of theology into several questions, and each question into divers articles —Such an account consists of so many articles.

ARTICLE is also applied to the several clauses or conditions of a contract, treaty of peace, or the like In this sense we say, articles of marriage, articles of capitulation, preliminary articles, &c

ARTICLE OF FAITH is by some defined a point of Christian doctrine, which we are

obliged to believe, as having been revealed by God himself, and allowed and established as such by the church

ARTICLES OF RELIGION, in the church of England. In the early ages of Christianity, the declaration that was required of a Christian's faith was conceived in very general terms; but, as heresies sprung up, it was thought necessary to guard against them, by enlarging the creeds or confessions of faith It was in imitation of this procedure that the Reformers were so copious in stating the doctrines of the church of England in that work which is entitled, "Articles whereupon it was agreed by Archbishops and Bishops of both provinces, and the whole Clergie, in the Convocation holden at London, in the yeare of our Lorde God 1562, according to the computation of the Church of Englande, for the voiding of the diversities of opinions, and for the establishing of consent touching true religion" There were two particular circumstances in that time which made this seem to be the more necessary the one was, that there sprung up, together with the Reformation, many sects; the other, that, having but just got rid of Popery, it was absolutely necessary to take the utmost precautions against it for the future These articles were prepared, as is most probable, by the bishops Cranmer and Ridley, and were published by royal authority The most authentic manuscript of them is in the library of Corpus Christi college in Cambridge It belonged to archbishop Parker, and was left by him to that college

The subscription to these articles is enjoined by statute, which establishes them, and requires every clergyman to declare his assent, and subscribe them in the presence of his ordinary The form of the subscription is not prescribed by the statute, but by the canon it is expressly required, that he acknowledge them, and every one of them, to be agreeable to the word of God There is a clause in the statute, which subjects every minister, who maintains any doctrine repugnant to these articles, to deprivation Notwithstanding this, however, very different opinions have been entertained by those who subscribe these articles concerning them and wide differences of opinions have likewise subsisted with regard to the nature and extent of subscription Some have interpreted them more laxly, and others more rigidly, and disagree much as to the extent to which their sentiments may run consistent with subscription so that, articles of religion, and a subscription, manifestly fail entirely in producing the great object for which they were established, namely, "Unity of Faith."

Indeed, as the excellent and judicious Dr Hartley has long ago observed, it seems entirely useless to all good purposes, to the promotion of piety and benevolence, in the present state of things, to form any creeds, articles, or systems of faith, and to require from clergymen or others an assent to these in words, or writing Men are to be influenced even in respect of the principal doctrines of God's providence, a future state, and the truth of the scriptures, by rational methods only, not by compulsion This seems acknowledged on all hands Why then should harsher methods be used in things of confessedly less importance? It is true, that magistrates have a power from God to inflict punishment upon such as disobey, and to confine the natural liberty of acting within certain bounds, for the common good of their subjects But all this is of a nature very foreign to the pretences for confining opinions by discouragements and punishments

Those who believe neither natural nor revealed religion practically, will be held by no restraints; they will appear to consent to any thing, just as their interest leads them And this is the case of a great part of the subscribers in all Christian communities They have a mere nominal faith only, at the time of subscribing, not even a speculative or historical one or, if they have any degree of seriousness, and good impressions, they must do proportional violence to these by performing a religious act out of a mere interested view

If the person be an earnest believer of natural religion, but an unbeliever in respect of revealed (to suppose this possible for argument's sake), he will not attempt any office in the Christian ministry However, he ought not to be deprived of civil privileges, whilst so many wicked nominal Christians are suffered to enjoy them

Suppose the person required to subscribe to be a speculative historical believer, why should his future enquiries be confined? How can he enquire honestly, if they be? How can a person be properly qualified to study the word of God, and to search out its meaning, who finds himself previously confined to interpret it in a particular manner? If the subject matter of the article be of great importance to be understood and believed, one may presume that it is plain, and needs no article, if of small importance, why should it be made a test, or insisted upon? If it be a difficult, abstruse point, no one upon earth has authority to make an article concerning it We are all brethren there is no father, no master, amongst us we are helpers of, not lords over, each other's faith If we judge from other branches of learning, as natural philosophy, or physic, we shall there find, that the pure evidence of the things themselves is sufficient to overcome all opposition The doctrines of gravitation, of the different refrangibility of the rays of light, of the circulation of the blood, &c can never be believed to any useful practical purpose, till they be examined and understood, and those, who now believe them, affirm, that this is all that is necessary for their universal reception If they should be mistaking in this, free examination would be so much the more requisite

The apostles' creed is so plain and clear, except in the three articles, concerning the descent of Christ into hell, the holy catholic church and the communion of saints that no

one who believes the truth of the scriptures, can hesitate about it; not even how to interpret the three forementioned articles, in a sense agreeable to the scriptures. As to the metaphysical subtleties which appear in the subsequent creeds, they can at best be only human interpretations of scripture words; and therefore can have no authority. Words refer to words, and to grammatical and logical analogies, in an endless manner, in these things; and all the real foundation which we have is in the words of scripture, and of the most ancient writers, considered as helps not as authorities. It is sufficient, therefore, that a man take the scriptures for his guide, and apply himself to them with an honest heart, and humble and earnest prayer, which things have no connection with forms and subscriptions.

Nay, it seems needless, or ensnaring, to subscribe even to the scriptures themselves. If to any particular canon, copy, &c. ensnaring, because of the many real doubts in these things. If not, it is quite superfluous from the latitude allowed. Yet still it appears incontestable that no careful, impartial enquirer can doubt of the great truths of the scriptures, such as the miraculous birth, life, death, resurrection, and ascension of Christ, &c. or of the practical consequences thence arising, and surely it cannot be necessarily requisite, that a man should believe more than these.

For, let us suppose the person required to assent, or subscribe, to be a *bona fide* believer. It can scarcely be supposed, that such a person should assent to any set of articles, so as honestly to affirm, that he would choose to express his own sense of the scripture language in these words. To strain either the scriptures, or the articles, must be a very ungrateful task to an ingenuous man, and perhaps there may be so wide a difference in some instances in his opinion, that no straining can bring them together. And thus some of the most earnest believers are excluded from the Christian ministry, and from certain common privileges of society, by a method, which suffers nominal wicked Christians to pass without difficulty.

If it be objected, that, unless preachers subscribe, they may teach different doctrines, it is obvious to answer that they do this, though they do subscribe, and that in the most important practical points. If the scriptures cannot yet produce a true unity of opinion on account of our present ignorance, and the weakness and wickedness of our natures, how should articles do this? Men can put as different senses upon articles as upon texts, and so dispute without end.

We may add, however, that though creeds, articles, &c. seem to have no use now, but even to be prejudicial to the cause of truth in themselves, yet it no way becomes a Christian to declaim against them in violent terms, or oppose them with bitterness, but merely, in a plain dispassionate way, to represent the truth of the case, so as by degrees to draw men's zeal from these less matters, and transfer it upon greater. "Let not him that eateth despise him that eateth not, and let not him which eateth not, judge him that eateth." Hartley on Man, vol. ii. p. 356.

ARTICLE, in grammar, denotes a particle used in most languages for the declining of nouns, and denoting their several cases and genders. The use of articles arises chiefly hence, that in languages which have no different terminations, to express the different states and circumstances of nouns, there is something required to supply that office. The Latins have no articles, but the Greeks, and most of the modern languages, have had recourse to them, for fixing and ascertaining the vague signification of common and appellative names.

Many and severe have been the disputes among grammarians upon the use and meaning of these little words. Reasoning oftentimes from a metaphor, they persuade themselves at last that they have made some notable discovery: and because in a building there must be joists and nails, we must have in language little words or pegs to keep all things together. Thus Mr Harris, whose knowledge was derived from the Greek language and Greek grammarians, and whose principles, as is natural from knowledge founded on so narrow a basis, are contradicted by the slightest acquaintance with the Teutonic and Arabic, leads us through many a maze, and we might have wandered till this moment, if Mr. Tooke, in his excellent work on the word *that*, enlarged in his Epea Pteroenta, had not pointed out to us the open and straight road of etymology, when we can travel upon it, and, when that fails us, of analogy. In the English language we call the words *a* and *the* article: the Germans have *ein* and *der*: the French *un* and *le*: the Greeks ὁ: the Hebrews ה: but the unfortunate Latins are said to be without these joints and pegs in speech. But if one language is without them, they are, it is evident, not essential to language: and it will be found difficult to make such a definition as shall exclude a variety of words, such as, *hic*, *this*, *that*, &c. from making a part of this division.

In the languages above mentioned the precise meaning of the words, *the*, *der*, *le*, ὁ, and ה, cannot at first sight be ascertained. The English word *a* points obscurely to its meaning. The German *ein* and the French *un* clear the road for investigation. They are to be found continually applied to substantives, and mean *one*: for it is obvious that in common conversation we must frequently find it necessary to limit the object of it to one of a species. As the object must sometimes be limited, at others this limitation may not be necessary, and it is curious to observe how different nations express the same idea. Thus if a thing is generally reported, we say in English "they say," meaning a great number say so: and so in French it is, *on dit*, or *unus dicit*, "one person says," so meaning more than one person by an ellipsis very common in that language: in German it is *man sagt*, by

man meaning man in general We have thus found, that in two languages one of the articles is merely a word of number. Probably it may be so in English, *a* may mean *one*, or it is an abbreviation of *any* By trying the two senses it is evident, that *any* cannot be applied in the room of *a*, but that *one* always can: and hence we might conclude that *a* and *an* are only other words for *one*, and answer to the German *ein*.

The article *the*, as it is called, may not discover itself so easily Yet let us try the same analogy, for the etymology of it is not ascertained *The* answers to *der* of the Germans, and *le* of the French but what is *le*? the *ille* of the Latins, and hence we may reasonably presume that our word *the* is no more an article than *ille*, and in fact that it comes from some adjective of the same signification Let us try by etymology In German we have *der, die, das* which was anciently *ther, thiu* (*thio thiu*) *thaz*, and in the plural *thie* (*thier*) This looks very much like our *the* In the Anglo-Saxon we find *sa, seo, that* in Islandic, *sa, su, that* in Gothic, *sa, so, thata* in Hebrew, [illegible] etymologists perhaps will not be displeased at our making the words [illegible] and *the* proceed from the same original, and we shall not be afraid of exposing ourselves to the laughter of critics, if we refer the Doric *ειν*, to the same stock If we are right in our conjectures, the word *the* is as much a pronoun as the *ille* of the Latins but, if persons choose to have a distinct class of words under the name of articles, we may say, that the English has two, *a* and *the*, which " serve to define and ascertain any particular object, so as to distinguish it from the other objects of the general class to which it belongs."

Father Buffier distinguishes a third kind of articles in French, which he calls intermediate or partitive, serving to denote part of the thing expressed by the substantives they are added to as, *des scavants ont cru*, " some learned men have supposed," I want *de la lumiere*, " some light." The use and distinction of the definite and indefinite articles *le* or *la*, and *de* or *du*, make one of the greatest difficulties in the French language; as being entirely arbitrary, and only to be acquired by practice.

ARTICLES OF WAR, are known regulations for the government of the army in the United Kingdom, dominions beyond the seas, and foreign parts dependant upon this country. They may be altered at the pleasure of the sovereign; and in certain cases they extend to civilians as when by proclamation any place shall be put under martial law, or when the people follow a camp or army for the sale of merchandize, or serve in any menial capacity It is ordained that the articles of war shall be read in the circle of each regiment belonging to the British army every month, or oftener if thought proper A soldier is not liable to be tried by a military tribunal unless the articles of war have been read to him

To ARTICLE *v a* To draw up in particular articles (*Taylor*)

ARTICULAR. (*articularis*, Lat.) Belonging to the joints.

ARTICULATE. *a* (from *articulus*, Lat) 1. Distinct. (*Milton*) 2 Branched out into articles (*Bacon*)

To ARTICULATE. *v a* (from *article*) 1. To form words; to speak as a man (*Glan*) 2. To draw up in articles (*Shakspeare*) 3 To make terms (*Shakspeare*)

ARTICULATE, in botany See JOINTED

ARTICULATELY *ad.* (from *articulate*) In an articulate voice. (*Decay of Piety*)

ARTICULATENESS *s.* (from *articulate*). The quality of being articulate

ARTICULATION *s* (from *articulate*) 1 The juncture, or joint of bones (*Ray*) 2 The act of forming words (*Holder*) 3 [In botany] The joints in plants

ARTICULATION, in anatomy, (*articulatio*, from *articulus*, a joint.) The connection of one bone with another. There are three genera of articulations, viz diarthrosis, or moveable connexion, synarthrosis, or immoveable connexion, and symphysis, or mediate connexion See DIARTHROSIS, SYNARTHROSIS, and SYMPHYSIS

Table of the Connexions of Bones

I. Diarthrosis, or moveable connexion
This genus contains five species
1. Enarthrosis,
2 Arthrodia,
3 Ginglymus,
4 Trochoides,
5 Amphiarthrosis.

II Synarthrosis, or immoveable connexion
This genus comprehends three species
1 Suture,
2 Harmony,
3 Gomphosis

III Symphysis, or mediate connexion, which has five species
1 Synchondrosis,
2 Syssarcosis,
3 Syneurosis,
4 Syndesmosis,
5 Synostosis For the rest, see ANATOMY

ARTICULATION is often considered as a branch of elocution; and in this sense a good articulation consists in giving every letter in a syllable its due proportion of sound, according to the most approved custom of pronouncing it; and in making such a distinction between the syllables of which words are composed, that the ear shall, without difficulty, acknowledge their existence, and perceive at once to which syllable each letter belongs. Where these points are not observed, the articulation is proportionally defective Exactness in sounding the words rightly, corresponds to propriety in spelling, and the articulation should be so clear and distinct, that the hearer may with ease keep pace with the speaker See Sheridan's Lectures on Elocution, p 19—29

A'RTIFICE. *s* (*artificium*, Latin) 1 Trick, fraud, stratagem (*South*) 2 Art, trade.

ARTI'FICER. *s* (*artifex*, Latin) 1. An

artist, a manufacturer (Sidney). 2. A forger; a contriver (*Milton*). 3. A dexterous or artful fellow (*B. Jonson*).

ARTIFI'CIAL. a. (*artificiel*, Fr.) 1. Made by art, not natural (*Wilkins*). 2. Fictitious, not genuine (*Shakspeare*). 3. Artful, contrived with skill (*Temple*).

ARTIFICIAL LINES, on a sector or scale, are certain lines so contrived, as to represent the logarithmic sines and tangents; which, by the help of the line of numbers, will solve all questions in trigonometry, navigation, &c. pretty exactly.

ARTIFI'CIALLY. ad. (from *artificial*.) 1. Artfully, with skill, with good contrivance (*Ray*). 2. By art; not naturally (*Addison*).

ARTIFI'CIALNESS. s. (from *artificial*.) Artfulness.

ARTILLERY, is originally a French word signifying archery. In a general sense it denotes the offensive apparatus of war, particularly of the missile kind: in modern acceptation it refers to the heavy equipage of war, comprehending all sorts of large fire arms, with their appurtenances, as cannon, mortars, howitzers, balls, shells, petards, muskets, carbines, &c. being what is otherwise called ordnance. The term is also applied to the larger instruments of war used by the ancients, as the catapult, balista, battering ram, &c.

The term Artillery, or Royal Artillery, is also applied to the persons employed in that service, and likewise to the art or science itself, and formerly it was used for what is otherwise called pyrotechnia, or the art of fireworks, with the apparatus and instruments belonging to the same.

In England the science of artillery early engaged attention. Lord Herbert informs us that, in 1544, king Henry VIII. had himself invented small pieces of artillery to defend his waggons. Since then the practice of artillery has been gradually improving, and the number of men employed in that service as regularly augmenting. The artillery of Great Britain is now extended to ten battalions of foot, with one troop of horse-artillery to each battalion, and their officers have for the greater part of a century enjoyed the most important advantages, in receiving the various preliminary branches of polite, literary, and scientific instruction connected with their profession, in the Royal Academy at Woolwich, originally established for their education exclusively.

For the construction of iron guns for battering pieces, and garrison, and ship guns, mortars, howitzers, and for other particulars relative to artillery in general, see the articles CANNON, MORTARS, HOWITZERS, GUNNERY, and PROJECTILES.

It would appear at a superficial view, that the adoption of cannon and gunpowder in war had rendered it more bloody and destructive than the method of fighting and the arms formerly in use; but the reverse of this will be found in reality to have taken place. The chief contest in modern warfare is for posts and stations, where artillery can have such command of the adjoining ground as to give a material superiority; and as the chief combat is carried on from a distance, on a reverse of fortune the defeated have more opportunities of safe retreat. Hence mere extermination of an enemy ceases to be the ultimate design of war: when a post is seized, those under its influence no longer think of contending, the odds against their success are so excessive, that it ceases to be any disgrace to yield, and those become prisoners of war who in the ancient warfare must have been devoted to massacre. In the history of remote periods, we often read of 200,000 or more men entering the field of battle, and not more than a dozen or two escaping alive, and in a few instances not even so many. Such sanguinary terminations to engagements never now occur, and it often happens that in a long campaign not more lives are lost than formerly have perished in a single battle.

The following observations of Dr. Smith on the subject shew still more the advantage to mankind in general of the use of cannon, and other modern instruments of war.

"In modern war the great expense of fire-arms gives an evident advantage to the nation which can best afford that expense, and consequently to an opulent and civilized over a poor and barbarous nation. In ancient times the opulent and civilized found it difficult to defend themselves against the poor and barbarous nations. In modern times the poor and barbarous find it difficult to defend themselves against the opulent and civilized. The invention of fire-arms, an invention which at first sight appears to be so pernicious, is certainly favourable both to the permanency and to the extension of civilization." *Nicholson's Encycloped.*

There have been many authors on the subject of artillery, the principal of which are Bucherius, Braunius, Tartalea, Collado, Sardi, Usano, Hanzelet, Digges, Moretti, Simienowitz, Mieth, d'Avelour, Manesson, Mallet, St. Julien, and the later authors, of still more consequence, are Belidor, St. Remy, le Blond, Valiere, Morogue, Puget, Coudray, Robins, Muller, Antoni, Tignola, Scheele, to which may be added the extensive and accurate experiments published in Dr. Hutton's volume of Tracts, and in the Philos. Transac. for 1778.

ARTILLERY (Brigade of), generally consists of eight or ten pieces of cannon, with all the machinery and officers to conduct them, and all the necessary apparatus thereto belonging.

ARTILLERY COMPANY, a regular battalion of infantry under the command of officers who are annually elected. It consists of gentlemen of character and property, bound by solemn declaration and obligation of attachment and fidelity to the king and constitution, and of readiness to join in supporting the civil authority, and of defending the metropolis. See the History of this Company, by A. Highmore, esq.

Artillery (Field), includes every requisite to forward the operations of an army, or of any part of an army acting offensively or defensively in the field. Field artillery may be divided into two distinct classes: field artillery properly so called, and horse artillery.

Regiments of artillery are always encamped half on the right and half on the left of the park. The company of bombardiers (when they are formed into companies) always takes the right of the whole, and the lieutenant-colonel's company the left, next to the bombardiers, the colonel's, the major's, &c. so that the two youngest are next but one to the centre or park: the two companies next to the park are the miners on the right, and the artificers on the left.

The colours are placed in the centre of the front line of guns, in the interval of the two alarm-guns, in a line with the bells of arms of the companies.

The lieutenant-colonel's and major's tents front the centres of the second streets from the right and left of the regiment.

Artillery (March of). The marches of the artillery are, of all the operations of war, the most delicate, because they must not only be directed on the object in view, but according to the movements the enemy make. Armies generally march in three columns, the centre column of which is the artillery: should the army march in more columns, the artillery and heavy baggage march nevertheless in one or more of the centre columns: the situation of the enemy determines this. If they are far from the enemy, the baggage and ammunition go before or behind, or are sent by a particular road; an army in such a case cannot march in too many columns. But should the march be towards the enemy, the baggage must be all in the rear, and the whole artillery form the centre column, except some brigades, one of which marches at the head of each column, with guns loaded, and burning matches, preceded by a detachment for their safety. The French almost invariably place their baggage in the centre.

A detachment of pioneers, with tools, must always march at the head of the artillery, and of each column of equipage or baggage.

If the enemy is encamped on the right flanks of the march, the artillery, &c. should march to the left of the troops, and *vice versa*. Should the enemy appear in motion, the troops front that way, by wheeling to the right or left by divisions, and the artillery, which marches in a line with the columns, passes through their intervals, and forms at the head of the front line, which is formed of the column that flanked nearest the enemy, taking care at the same time that the baggage be well covered during the action.

Artillery (Park of), is that place appointed by the general of an army to encamp the train of artillery, apparatus, ammunition, as well as the battalions of the artillery, appointed for its service and defence. The figure of the park of artillery is that of a parallelogram, unless the situation of the ground renders another necessary.

The park of artillery is generally placed in the centre of the second line of encampment, and sometimes in the rear line, or corps of reserve. In both places the muzzles of the guns are in a line with the fronts of the serjeants' tents of the regiments of artillery and infantry. Some generals choose to place the park about three hundred paces before the centre of the front line of the army. But let the situation be where it will, the manner of forming the park is almost every where the same. The most approved method is to divide the whole into brigades, placing the guns of the first to the right of the front line, and their ammunition behind them, in one or more lines. The different brigades should be all numbered, as well as every waggon belonging to them. This method will prevent confusion in the forming and breaking up of the park, as also on a march: besides, according to the numbers, the stores therein contained are known.

Traile or *Train of Artillery*, a number of pieces of ordnance, mounted on carriages, with all their furniture fit for marching. To this commonly belong mortars, cannon, balls, shells, &c.—There are trains of artillery in most of the royal magazines, as in the Tower, Portsmouth, Plymouth, &c. but, above all, at Woolwich, from whence the ships commonly receive their ordnance, and where they are all completely proved before they are received into the public service.

At the battle of Jemappe, which was fought between the French and Austrians on the 6th of November, 1792, the latter had 120 pieces of cannon disposed along the heights of Framery, whilst their effective force in men did not exceed 17,000. The French on this occasion brought nearly the same quantity of ordnance, some indeed of extraordinary calibre, but their strength in men was considerably more formidable.

ARTISA'N (French.) 1. Artist, professor of an art (*Wotton*). 2. Manufacturer, low tradesman (*Addison*).

A'RTIST. *s.* (*artiste*, Fr.) 1. The professor of an art (*Newton*). 2. A skilful man, not a novice (*Locke*).

Artist, in a general sense, a person skilled in some art, or, according to Mr. Harris's definition, a person possessing an habitual power of becoming the cause of some effect, according to a system of various and well-approved precepts. Evelyn tells us of a privilege granted at Vicenza to artists, like that of clergy in England, in virtue whereof, criminals adjudged to death saved their lives if they could prove themselves the most excellent and consummate workmen in any useful art.

Artist, Artista. In an academical sense, denotes a philosopher or proficient in the faculty of arts. In the early ages of universities, the seven liberal arts completed the whole course of study, or philosophy, as it was called, whence the masters of this faculty were denominated Artists. What they understood

by the liberal arts used to be summed up in the following Latin verse —

Lingua, Tropus, Ratio, Numerus, Tonus, Angelus, Astra.

ARTISTA is a term more peculiarly used by Paracelsus and other adepts, for a chemist or alchemist — We find frequent mention, in authors of this class, of Elias Artista, or Elias the artist, who is to come some time before the dissolution of the world, and make perfect all arts and sciences, but especially the gold-making art, &c

A'RTLESSLY *ad* (from *artless*) In an artless manner; naturally, sincerely (*Pope*).

A'RTLESS *a* (from *art* and *less*) 1 Unskilful, wanting art (*Dryden*) 2. Void of fraud as, an artless maid 3. Contrived without skill as, an artless tale

ARTOCA'RPUS (from αρτος, *bread*, and καρπος, *fruit*) Bread-fruit-tree a genus of the class and order monoecia monandria Male, an ament, calyxless, corol two-petalled Female, calyxless, corolless, style one; berries one-seeded, connecting and forming a roundish berried head There are two species

1 A incisa The true and valuable bread-fruit tree of Otaheite and the adjoining islands, first brought into general notice by captain Cook The tree is of the height and proportion of a middle-sized oak: the leaves are often a foot and a half long, oblong-shaped, and in colour, consistence, and sinuosity resembling those of the fig-tree, and exuding a milky juice upon their fracture The fruit is about the size and shape of a new-born child s head, covered with a thick, reticulate skin, and containing a core in its centre The eatable part lies between the skin and core, white as snow, and of the consistence of new-bread It is prepared for food by being divided into three or four parts, and then roasted its taste is sweetish, but otherwise insipid There are various other ways of cooking it The name among the natives is mahie

2 A integrifolia, called by the natives joccahee, and by our own merchants jack-tree It is a native of the East Indies, but its fruit is small and less esteemed than that of the mahie

ARTOIS, a late province of the French Netherlands, now included in the department of the Straits of Calais.

ARTOTYRITES, a Christian sect, in the primitive church, who celebrated the eucharist with bread and cheese, saying, that the first oblations of men were not only of the fruits of the earth, but of their flocks. The word is derived from αρτος, bread, and τυρος, cheese

ARVALES FRATRES, in Roman antiquity, a college of twelve priests, instituted by Romulus, and chosen out of the most noble families, himself being one of that body they assisted in the sacrifices of the ambervalia annually offered to Ceres and Bacchus, for the prosperity of the fruits of the earth; when they wore on their heads crowns made of ears of corn.

ARUBA, an island near the coast of Venezuela, in South America It is one of the Little Antilles, and is subject to the Dutch Lat. 12. 30 N Lon 67. 35 W

ARVERNI, in ancient geography, a denomination given to one of the most powerful nations of Gaul, whose country was, according to Strabo, situated between the ocean, the Pyrenees, and the Rhine.

ARVIL-SUPPER, a feast or entertainment made at funerals in the north of England. Arvil-bread is the bread delivered to the poor at funeral solemnities: and arvil, arval, arfal, are terms used for the burial or funeral rites

ARVISIUM (from *Arvisia*, a promontory of the isle of Chios, where it was made) Malmsy: a rich cordial wine

ARUM (*arum*, from the Hebrew, יר, *jaron*, which signifies a dart, so named because its leaves are shaped like a dart, or, according to Lobelius, from ιερον, *sacred*, as resembling the member consecrated to the increase and fruitfulness of mankind) Wake-robin or cuckow-pint a genus of the class and order monoecia hexandria Spathe one-leafed, convolute at the base, spadix cylindrical, androgynous, naked above, bearing the stamens in the middle, and the germs at the base; berries one-celled Thirty-two species scattered over the globe It is a native tree of Guiana

ARUM MACULATUM The root of this species (the common cuckow-pint) is medicinal; and when recent, very acrimonious It is employed as a stimulant in chlorotic, rheumatic, and paralytic cases, mixed with oleaginous or mucilaginous substances to sheath its acrimony The London Pharmacopœia directs a conserve to be made of the fresh root

ARUM (African) See CALLA

ARUM (Floating) See ORONTIUM

ARUNDEL, an old borough and market town of Sussex It has a good market on Wednesdays, and a petty one on Saturdays It is governed by a mayor and burgesses, and sends two members to parliament This borough was mentioned in king Alfred's will The manor has constantly gone with the castle, and by an act of parliament passed in the reign of Henry VI it was declared, that all who should be possessed of the castle and honour of Arundel, were, and should thereby be, earls of it, without any other creation It is the only privilege of the kind in England Lat. 50 55 N. Lon 0 20 W

ARUNDELIAN MARBLES, called also the Parian Chronicle, are ancient stones, on which is inscribed a chronicle of the city of Athens, supposed to have been engraven in capital letters, in the island of Paros, 264 years before Christ. They take their name from the earl of Arundel, who procured them from the east, or from his grandson, who presented them to the university of Oxford. The authenticity of these marbles has led to a controversy between Mr. Robertson, who in his Parian Chronicle questioned it, and Mr. Hewlett, who defended it in a Vindication of the Authenticity of the Parian Chronicle, which see.

ARUNDINA'CEOUS, *a.* (*arundinaceus*, Latin.) Of, or like reeds.

ARUNDI'NEOUS, *a.* (*arundineus*, Lat.) Abounding with reeds.

ARU'NDO. Reed: a genus of the class and order triandria diandria. Calyx two-valved; florets surrounded with long permanent wool. Eleven species, most of which are natives of our own country, and may be found in ditches, moist woods, and stagnant waters. The a. arenaria alone demands a dry soil, and chiefly flourishes on our sandy shores. The Turks make their pens from the a. orientalis.

ARUNDO FLORIDA. See CANNA.

ARUNDO ROTANG. See CALAMUS.

ARUNDO SACCHARIFERA. See SACCHARUM.

ARUSPICES, or HARUSPICES, in Roman antiquity, an order of priests who pretended to foretel future events by inspecting the entrails of victims killed in sacrifice; they were also consulted on occasion of portents and prodigies.

ARX, in the ancient military art, a town, fort, or castle, for defence of a place.

ARX, also denoted a consecrated place on the Palatine Mount where the augurs publicly performed their office.

ARX BRITANNICA, a citadel of Batavia, whose foundation is seen at low water, near the old mouth of the middle Rhine. Some imagine it the pharos or high tower of Caligula, as Suetonius calls it, a monument of Caligula's sham conquest of Britain. Others, that it was built by Drusus, with an altar afterwards by Claudius, on his expedition into Britain.

ATYTÆNIO-EPIGLOTTIDEUS. A muscle composed of a number of fibres running between the arytænoid cartilage and epiglottis. It pulls the side of the epiglottis towards the external opening of the glottis, and when both act, they pull it close upon the glottis.

ARYTÆNOID CARTILAGE (*cartilago arytænoidea*, from *ἀρύταινα*, *a funnel*, and *εἶδος*, *shape*.) The name of two cartilages of the larynx.

ARYTÆNOIDEUS MINOR. See ARYTÆNOIDEUS OBLIQUUS.

ARYTÆNOIDEUS MAJOR. See ARYTÆNOIDEUS TRANSVERSUS.

ARYTÆNOIDEUS OBLIQUUS. Arytænoideus minor of Douglas. A muscle of the glottis, which arises from the base of one arytænoid cartilage, and crossing its fellow, is inserted near the tip of the other arytænoid cartilage. It is a muscle that is occasionally wanting; but when present, and both muscles act, their use is to pull the arytænoid cartilages towards each other.

ARYTÆNOIDEUS TRANSVERSUS. Arytænoideus major of Douglas. An azygos, or single muscle of the glottis, that arises from the side of one arytænoid cartilage, from near its articulation with the cricoid, to near its top. The fibres run across, and are inserted in the same manner into the other arytænoid cartilage. Its use is to shut the glottis, by bringing the two arytænoid cartilages, with their ligaments, nearer to each other.

ARZES, in ancient geography, a town of the island of Cyprus, formerly a considerable city, and see of a Greek bishop; but now reduced to a village.

AS, in antiquity, a particular weight, consisting of twelve ounces, being the same with libra, or the Roman pound.

As was also the name of a Roman coin, which was of different matter and weight, according to the different ages of the commonwealth.

It is also used to signify an integer (whence the English word *ace*), divisible into twelve parts, from which last acceptation it signified a whole inheritance.

The as had several divisions: the principal of which were the uncia, or ounce, being the twelfth part of the as; sextans, the sixth part of the as, quadrans, the fourth part, triens, the third part, and semis, half the as, or six ounces. Bis was two-thirds of the as, or eight ounces, and dodrans, three fourths of the as.

M. Paucton in his Metrologie estimates the value of the as, from the foundation of Rome till the year 537, at 20 sols, or a livre; though it was sometimes 29 sols. from the year of Rome 537 to the year 544, at three French sols, its weight being two Roman ounces of copper. from 544 to 586 at one sol ten and a half deniers, its weight being one Roman ounce. from 586 to the reign of Claudius or of Nero, one sol one and a half denier. from the reign of Claudius or of Nero to that of Constantine, about one sol.

As *conjunct* (*als*, Teut.) 1. In the same manner with something else (*Shakspeare*). 2. In the manner that (*Dryden*). 3. That in a consequential sense (*Wotton*). 4. In the state of another (*A. Philips*). 5. Under a particular consideration (*Gay*). 6. Like; of the same kind with (*Watts*). 7. In the same degree with (*Blackmore*). 8. As if, according to the manner that would be if (*Dryden*). 9. According to what (*Addison*). 10. As it were; in some sort (*Bacon*). 11. While, at the same time that (*Addison*). 12. Because (*Taylor*). 13. As being (*Bacon*). 14. Equally (*Dryd.*). 15. How, in what manner (*Boyle*). 16. With; answering to *like* or *same* (*Shak.*). 17. In a reciprocal sense, answering to *as* (*Bentley*). 18. Going before *as*, in a comparative sense, the first *as* being sometimes understood (*Addison*). 19. Answering to *such* (*Tillotson*). 20. Having *so* to answer it, in a conditional sense (*Locke*). 21. Answering to *so* conditionally (*Dryden*). 22. In a sense of comparison, followed by *so* (*Pope*). 23. As for; with respect to (*Dryden*). 24. As if, in the same manner that it would be if (*Locke*). 25. As to; with respect to (*Swift*). 26. As well as, equally with (*Locke*). 27. As though; as if (*Sharp*).

ASA. (*אסא*, from *אסא*, *asa*, to heal, Heb.)

A gum so called from its properties, as asafœtida and asadulcis.

ASA-DULCIS. Gum benzoin. See BENZOINUM.

ASA-FŒTIDA (from *asa*, which see.) Gum asafœtida, so denominated from its smell. The plant which affords this gum resin is the ferula asafœtida of Linnéus (ferula foliis alternatim sinuatis obtusis; class pentandria, order digynia), which grows plentifully on mountains in the provinces of Chorasaan and Laar in Persia. The process of obtaining it is as follows: the earth is cleared away from the top of the roots of the oldest plants, the leaves and stalks are then twisted away, and made into a covering to screen the root from the sun, in this state the root is left for forty days, when the covering is removed, and the top of the root cut off transversely, it is then screened again from the sun for forty-eight hours, when the juice it exudes is scraped off, and exposed to the sun to harden.

A second transverse section of the root is made, and the exudation suffered to continue for forty-eight hours, and then scraped off. In this manner it is eight times repeatedly collected in a period of six weeks. The juice thus obtained has a bitter, acrid, pungent taste, and is well known by its peculiar nauseous smell, the strength of which is the surest test of its goodness. It is highly esteemed as an antihysteric, nervine, and stimulating remedy, and is much used in hysteria, hypochondriasis, dyspepsia, &c.

ASAM, in geography. See ASSAM.

ASAPH (St.), a city of Flintshire, on the river Elway, whence the British call it Llan Elwy. It is a poor town; but has a small market on Saturdays. Lat. 53. 12 N. Lon. 3. 36 W.

ASAPHEIS (from α neg. and σαφης, *clear, open*.) A term used by Hippocrates for such patients as do not utter their words in a clear manner.

ASAPPES, or AZAPES, an inferior order of soldiers in the Turkish army, who are always exposed to the first shock of the enemy, to the end that the enemy being thus fatigued, and their swords blunted, the spahis and janisaries may fall on and find an easy conquest. The word is derived from the Turkish *saph*, which signifies rank, from whence they have formed *asphaph*, to range in battle.

ASARABACCA. See ASARUM.

ASARUM (*asarum*, from α neg. and σαιρω, *to adorn*, because it was not admitted into the ancient coronal wreaths). Asarabacca. A genus of the class and order dodecandria monogynia. Calyx three-cleft, standing on the germ; corolless, stamens twelve, capsule coriaceous, six-celled, stigma six-cleft. Three species, one of which, the a. europum, is a native of England, but not very common. The leaves of this plant are extremely acrid, and are occasionally used, when powdered, as a sternutatory. The plant was formerly very generally employed internally as well as externally.

ASARUM HYPOCISTIS. See CYTINUS.

ASBAMÆA, in ancient geography, a fountain dedicated to Jupiter, near Tyana in Cappadocia: its waters, though in a state of apparent ebullition, were cold.

ASBESTINE, a. (from *asbestos*.) Something incombustible, or that partakes of the nature and qualities of asbestos.

ASBESTOID. See ACTINOTUS.

ASBESTUS. Asbest. In oryctology, a genus of the class earths, order talcose: consisting of carbonat of magnesia, silex, and generally alumina, with frequently oxyd of iron; rarely carbonat of lime: dry to the touch, fibrous, soft, light, and floating; brittle in the fire, parasitic. Ten species, some with all the fibres parallel, others with the fibres interwoven and breaking into obtuse angled fragments. The following are the chief.

1. A. amiantus. Amiant. Flexible asbestus or mountain flax. Found with Serpentine in the Ural, Lapland, Swedish, and many European mountains, as also in Candia and China. Floating with very fine highly separable fibres.

2. A. maturus. Plumous amiant. Harder, with the fibres more closely cohering, separating rather into a kind of down than distinct fibres. Probably only a variety of a. amiantus. Found in Sweden.

3. A. fragilis. Glassy asbest, or feathered alum: shining like glass with separable, very fragile fibres. Found in Siberia and Sweden. Taken internally highly deleterious, but has been sometimes employed as a stimulant in paralysis and other atonic affections of the nervous system.

4. A. vulgaris. Common asbest. Found in Siberia, Lapland, Sweden, Silesia, Saxony, Franconia, and Tyrol, generally in wedge-shape pieces.

5. A. suber. Mountain cork. Elastic asbest. Flexible; resembling cork, imbibing water with a noise, adhering to the tongue. Found in the mines of Sweden, Saxony, Hungary, &c. containing often silver ores, in thick compact pieces.

6. A. lignum. Mountain-wood: ligniform asbest. Resembling wood in colour and texture. Found at Clausen in Tyrol: colour brown, and if broken across discovers an irregular filamentous structure like wood.

7. A. caro. Mountain leather. Found in the iron mines of Sweden, in pieces of the thickness and consistence of tanned horses' skin.

The industry of mankind has devised methods of working the more flexible varieties of this substance, and employing it in divers manufactures, chiefly cloth and paper. Pliny calls the asbestos *inventu rarum, textu difficilimum*, but however this be, Bapt. Porta assures us, that in his time the spinning of asbestos was a thing known to every body at Venice, and signior Castagnatta, superintendant of some mines in Italy, is said to have carried the manufacture to such perfection, that his asbestos was soft and tractable, much resembling

lamb-skin dressed white he could thicken and thin it at pleasure, and thus either make it into a very white skin, or a very white paper.

This kind of linen cloth was chiefly esteemed by the ancients, though then better known and more common than among us, being held equally precious with the richest pearls nor is it now of mean value, even in the country where it is most generally made, a China cover (i. e. a piece of twenty-three inches and three quarters long) being worth 80 tale, i. e. 30*l* 13*s* 4*d*. Pliny says, he himself had seen napkins thereof, which, being taken foul from the table after a feast, were thrown into the fire, and by that means were better scoured than if they had been washed in water, &c. But its principal use, according to Pliny, was for the making of shrouds for royal funerals to wrap up the corpse, so that the ashes might be preserved distinct from those of the wood, &c whereof the funeral pile was composed. A handkerchief or pattern of this linen was long since presented to the Royal Society, a foot long, and half a foot broad. This gave two proofs of its resisting fire; though, in both experiments, it lost above three drachms in its weight. When taken out red-hot, it did not burn a piece of white paper, on which it was laid. Mr Villette asserts, that his large burning concave usually vitrifies the asbestos.

ASCALAPHUS, a tribe of Fabricius. See Myrmeleon.

ASCALON, an ancient town of Palestine, in Asia, formerly a bishop's see, but now dwindled almost to nothing. The Turks call it Scalona. In the temple of Dereto in this city, Herod, the father of Antipater, and grandfather of Herod the Great, served as priest.

ASCARIDES. See Ascaris.

ASCARINA. In botany, a genus of the class and order dioecia, monandria. Ament filiform, corolless. Male: anther worm-shaped (whence its name, see Ascaris,) four-grooved. Fem. styleless; stigmas three-lobed; drupe. The only known species is a native of the Society isles.

ASCARIS, (ἀσκαρίς, from ἀσκεω, *to move about*.) An intestinal worm so called from its troublesome motion. The ascaris in the Linnéan system of zoology is a genus of the class vermes, order intestina: thus generically characterised: Body round, elastic, and tapering towards each extremity; head with three vesicles; tail obtuse or subulate; intestines spiral, milk-white and pellucid. There are eighty species, generally deriving their specific name from the animal they chiefly infest,—for the intestinal canal of most animals is affected by some species or other. They may be thus subdivided, according to the zoological classes.

A. Infesting the mammal class.
B. ——— birds.
C. ——— reptiles.
D. ——— fishes.
E. ——— insects.
F. ——— worms.

We only notice the following. 1. A. vermicularis. Thread-worm. Head subulate naked, at the sides of the body, very finely crenate or wrinkled. Inhabits the intestines of children, and thin debilitated adults, principally in the rectum. These worms are generally found in considerable numbers, occasioning troublesome symptoms, and often creeping into the stomach. They are viviparous, and about half an inch long. The female has a small punctiform aperture a little below the head, through which the young are protruded. Head nodose, and divided into three vesicles, in the middle of each of which is an aperture through which it receives nourishment. Body a little dilated in the middle and wrinkled at the sides, pellucid and angular, but gradually tapering and terminating in a fine point, with a small aperture or vent below the middle of the worm.—2. A. lumbricoides. long round worm. Head slightly incurved with a transverse contraction beneath it: mouth triangular: inhabits the intestines of emaciated persons, generally about the ileum, whence it sometimes ascends into the stomach and creeps out at the mouth or nostrils. Frequently very numerous and vivacious. Length from twelve to fifteen inches, breadth that of a goose quill. Body transparent, light yellow with a faint line down the side. They are oviparous, and distinguished from the lumbricus terrestris or earth worm, in wanting the fleshy ring below the head, and in having three vesicles. The a. vespertilionis. a. phocæ. a. aquilæ. a. cygni, &c. from the animal they infest. For the medical treatment of diseases produced by this, and other worms, on the animal frame, see the articles Invermination, and Nosology.

To ASCEND. *v. n.* (*ascendo*, Latin.) 1. To move upward, to mount (*Milton*). 2. To proceed from one degree of good to another (*Watts*). 3. To stand higher in genealogy (*Broome*).

To Ascend. *v. a.* To climb up any thing (*Delany*).

ASCENDANT, in astrology, denotes the horoscope, or the degree of the ecliptic which rises upon the horizon at the time of the birth of any one. This, it is pretended, has an influence on the person's life and fortune, by giving him a propensity to one thing more than another.

Ascendant, denotes 1. Height, elevation (*Temple*). 2. Superiority, influence (*Clar.*). 3. One of the degrees of kindred reckoned upward (*Ayliffe*).

Ascendant. *a.* 1. Superiour, predominant, overpowering (*South*). 2. In an astrological sense, above the horizon (*Brown*).

ASCENDENCY. *s.* (from *ascend*.) Influence, power (*Watts*).

ASCENDING, in astronomy, is applied to any star, or point of the heavens when rising above the horizon.

Ascending latitude, is the latitude of a planet when going towards the north pole.

Ascending node, is that point of a planet's orbit, wherein it passes the ecliptic, to proceed northward. This is otherwise called

the northern node, and represented by this character ☊

ASCE'NSION *s* (*ascensio*, Latin) 1. The act of ascending or rising, frequently applied to the visible elevation of our Saviour to heaven (*Milton*) 2 The thing rising or mounting, (*Brown*)

Ascension, in astronomy, is either right or oblique

Right Ascension of the sun, or of a star, is that degree of the equinoctial, accounted from the beginning of Aries, which rises with them, in a right sphere —Or, Right Ascension is that point of the equinoctial, counted as before, which comes to the meridian with the sun or star, or other point of the heavens And the reason of thus referring it to the meridian, is, because this is always at right angles to the equinoctial, whereas the horizon is so only in a right or direct sphere To find the right ascension of the sun, stars, &c by trigonometry, say, As radius is to the cosine of the sun's greatest declination, or obliquity of the ecliptic, so is the tangent of the sun's or star's longitude, to the tangent of the right ascension

Right Ascension of the Mid-heaven, often used by astronomers, especially in calculating eclipses by means of the nonagesimal degree, is the right ascension of that point of the equator which is in the meridian; and it is equal to the sum of the sun's right ascension and the horary angle reduced to degrees

Oblique Ascension, is an arch of the equator intercepted between the first point of Aries, and that point of the equator which rises together with the star, &c in an oblique sphere —The Oblique Ascension is counted from west to east, and is greater or less, according to the various obliquity of the sphere

Ascensional Difference is the difference between the right and oblique ascension of the same point on the surface of the sphere To find the same ascensional difference trigonometrically, having the latitude of the place, and the sun's declination given, say, As radius is to the tangent of the latitude, so is the tangent of the sun's declination to the sine of the ascensional difference This reduced to time reckoning 15° to an hour, shews how much the sun rises before, or sets after, six o clock

Ascension (Isle of,) a dreary desolate island among the African islands situated on the Southern Atlantic ocean S Lat 7 56½ W Lon 14 22½ This island was discovered in 1501, by J de Nova Galegs, a Portuguese navigator

Asce'nsion-day, The day on which the ascension of our Saviour is commemorated, commonly called Holy Thursday, the Thursday but one before Whitsuntide

ASCE'NSIVE, *a* (from *ascend*) In a state of ascent not in use (*Brown*)

ASCE'NT *s* (*ascensus* Latin) 1 Rise, the act of rising (*Milton*) 2 The way by which one ascends (*Bacon*). 3 An eminence, or high place (*Addison*)

Ascent of fluids. See Capillary action

Ascent of vapour. See Evaporation

To ASCERTA'IN *v. a.* (*acertener*, Fr) 1. To make certain; to fix; to establish (*Locke*) 2. To make confident (*Hammond*)

ASCERTA'INER. *s* (from *ascertain*) The person that proves or establishes.

ASCERTA'INMENT *s.* (from *ascertain*) A settled rule; an established standard (*Swift*).

ASCESIS, (ἄσκησις,) properly denotes exercise of the body But it is used by philosophers to denote an exercise conducive to virtue, or to the acquiring a greater degree of virtue.

ASCETERIUM, in ecclesiastical writers, is frequently used for a monastery, or places set apart for the exercises of virtue and religion. The word is formed from ascesis, exercise, or, ascetra, one who performs exercise, Originally it signified a place where the athletæ or gladiators performed their exercises.

ASCETIC, an ancient appellation given to such persons as, in the primitive times, devoted themselves more immediately to the exercises of piety and virtue, in a retired life, and particularly to prayer, abstinence, and mortification The word is derived from ἀσκέω, *I exercise* In monkish times this title was bestowed on that order of ecclesiastics, especially upon such of them as lived in solitude

Ascetic is also a title of several books of spiritual exercises, as the Ascetics, or devout exercises of St Basil

ASCHAM (Roger), a learned English writer, was born at Kirby Whiske, in Yorkshire, about 1515. In 1530, he entered at St John's college, Cambridge, where, in 1534, he took his degree of B A and was elected fellow In 1536, he was created M.A and was appointed teacher of Greek in the schools. In 1544, Henry VIII settled a pension of 10l a year upon him, and about the same time he was appointed tutor to lady Elizabeth, with whom he read most of Cicero's works, the orations of Isocrates, the plays of Sophocles, and other ancient authors After being employed in this honourable manner two years, he returned to Cambridge, and had a pension settled upon him by king Edward. Here he filled the office of public orator with great reputation. In 1550, he attended sir Richard Morysine in his embassy to the emperor Charles V. and remained in Germany three years. He died in London in 1568, and was interred in St. Sepulchre's church His most esteemed work is entitled, The Schoolmaster, or a plain and perfect Way of teaching Children to understand, write, and speak the Latin Tongue, &c. It was first printed in 1571. An excellent edition by Mr. Upton appeared in 1711. Mr. Ascham's Latin epistles have been frequently printed, and are admired by all good judges of elegant composition. His works were printed entire in 1 vol 4to. in 1769.

ASCIA, in antiquity, an instrument, supposed to be of the ax kind, used in the fabric

of the Roman tombs, and frequently represented upon them.

ASCIDIA. In zoology, a genus of the class and order vermes molusca. Body fixt, roundish, and apparently issuing from a sheath; apertures two, generally placed near the upper end, one beneath the other. Thirty-five species; almost all of them inhabitants of the European seas and chiefly of the northern, in high latitudes. They adhere by their base to rocks, shells, and other submarine substances, they are more or less gelatinous, and have the power of squirting out the water they take in, some of them are esculent, most of them sessile, though a few are furnished with a long stalk or tubular stem. They contract and dilate themselves alternately.

ASCII. s. It has no singular (α and σκια, *shadow*.) Those people who, at certain times of the year, have no shadow at noon. Such are all the inhabitants of the torrid zone, who have the sun vertical to them twice a year.

ASCITES, (*ascites*, from ασκος, *a sack, or bottle*.) Dropsy of the belly. A tense, but scarcely elastic, swelling of the abdomen from the accumulation of water. Cullen ranks this genus of disease in the class cachexiæ, and order intumescentiæ. He enumerates two species. 1. Ascites abdominalis, when the water is in the cavity of the peritonæum, which is known by the equal swelling of the parietes of the abdomen. 2. Ascites saccatus, or encysted dropsy, in which the water is encysted, as in the ovarium; the fluctuation is here less evident, and the swelling is at first partial.

ASCI'TICAL. ASCI'TICK. *a.* (from *ascites*.) Dropsical, hydropical (*Wiseman*).

ASCITI'TIOUS. *a.* (*ascititius*, Latin.) Supplemental; additional (*Pope*).

ASCIUM. In botany, a genus of the class and order polyandria, monogynia. Calyx five-leaved, petals five, berry four-celled, with two seeds in each. The only known species is a native tree of Guiana eighty feet high, with violet flowers.

ASCLEPIAD, in ancient poetry, a verse composed of four feet, the first of which is a spondee, the second a choriambus, and the two last dactyls: or of four feet and a cæsura, the first a spondee, the second a dactyl, after which comes the cæsura, then the two dactyls, as, Mæcenas atavis edite regibus.

ASCLEPIADES, one of the most celebrated physicians among the ancients, was a native of Prusa, in Bithynia; and practised physic at Rome, under Pompey, ninety-six years before the Christian æra. He was the head of a new sect, and, by making use of wine and cold water in the cure of the sick, acquired a very great reputation. He wrote several books, which are frequently mentioned by Galen, Celsus, and Pliny; but they are now lost.

ASCLEPIADES, a famous physician under Hadrian, of the same city with the former. He wrote several books concerning the composition of medicines, both internal and external.

ASCLEPIAS, (*asclepias, adis*, ασκληπιας, from Asclepias, its discoverer, or from Æsculapius, the god of medicine.) In botany, swallow-wort, of which some of the species are shrubs and others herbaceous plants, tall, upright, and perennial, with a milky, and very acrid juice, affecting many constitutions with an appearance of being poisoned. The asclepias is a genus of the class and order pentandria digynia. Corol twisted, nectaries five, ovate, concave, putting out a little horn. Forty-one species, chiefly natives of the Cape or of the East or West Indies. They may be subdivided into those, 1 with opposite flat-leaves, 2 leaves revolute at the margin, 3 alternate leaves. The a. nivea, of South America, with green corols and snowy nectaries, is the most beautiful. Many of the others, and especially the a. vincetrixicum, have been formerly esteemed in medicine, but have been long growing into disrepute.

ASCOBOLUS. In botany, a genus of the class and order cryptogamia, fungi. Fungus hemispherical, containing oblong vesicles, somewhat immersed in its disc, which elastically eject the seeds. The only known species is the a. stercorarius described by Sowerby.

ASCODRUTÆ, in church history, a sect of gnostics, who placed all religion in knowledge; and under pretence of spiritual worship, would admit of no external or corporeal symbol whatever.

ASCOGEPHYRUS, in middle age writers, denotes a bridge supported on bags made of leather or bullock's hides.

ASCOLI, formerly Asculum Apulum, pretty large town in Italy. Lat. 42. 24 N. Lon. 13. 29 E.

ASCOLI DE SATRIANO, formerly Asculum Picenum, an episcopal city of Italy. Lat. 41. 8 N. Lon. 15. 20 E.

ASCOLIA, in Grecian antiquity, a festival celebrated by the Athenian husbandmen in honour of Bacchus, to whom they sacrificed he goat, because that animal destroys the vines. Out of the victim's skin it was customary to make a bottle, which, being filled with oil and wine, fell as a reward to him who first fixed himself upon it with one foot.

ASCOPHORA. In botany, a genus of the class and order cryptogamia, fungi. Fungus erect on a setaceous stalk, head globular, oblong, inflated, opake, elastic, bearing the seed externally. Seven species, some clustered on a common convex receptacle, others detached.

ASCOT HEATH, a famous race-ground four miles from Windsor, in the road from the Great Park to Reading. Here the king's stag hounds are kept.

ASCRI'BABLE. *a.* (from *ascribe*.) That may be ascribed (*Boyle*).

To ASCRI'BE. *v. a.* (*ascribo*, Latin.) 1. To attribute to, as a cause (*Dryden*). 2. To attribute to, as a possessor (*Tillotson*).

ASCRI'PTION. *s.* (*ascriptio*, Lat.) The act of ascribing.

ASCRIPTITI, or ADSCRIPTITII, were

description of villains, who, coming from abroad, settled in the lands of some new lord, whose servants or subjects they became, being annexed to the lands, and like other villains transferred and sold with him.

ASCRIPTI'TIOUS *a* (*ascriptitius*, Lat.) That is ascribed.

ASCUS, in natural history, the folliculus, abdominal pouch, or recep'acle, with which nature has furnished animals of the opossum tribe.

ASCYRUM. St Peters wort, a genus of the class and order polyadelphia polyandria. Calyx four-leaved, petals four, filaments numerous, disposed in four sets. Five species, natives of the West Indies or North America.

ASDRUBAL, a Carthaginian, son-in-law of Hamilcar. He distinguished himself in the Numidian war, and was appointed chief general on the death of his father in-law, and for eight years presided with much prudence and valour over Spain, which submitted to him with cheerfulness. Here he laid the foundation of new Carthage, and saw it complete. He was killed in the midst of his soldiers, B C 220, by a slave whose master he had murdered. Ital. Polyb.—2 A son of Hamilcar, who came from Spain with a large reinforcement for his brother Annibal. He crossed the Alps, and entered Italy; but some of his letters to Annibal having fallen into the hands of the Romans, the consuls M. Livius Salinator, and Claudius Nero, attacked him suddenly near the Metaurus, and defeated him, B C 207. He was killed in the battle, and 56,000 of his men shared his fate, and 5400 taken prisoners, about 8000 Romans were killed. The head of Asdrubal was cut off, and some days after thrown into the camp of Annibal, who, in the moment that he was in the greatest expectations for a promised supply, exclaimed at the sight, "In losing Asdrubal, I lose all my happiness, and Carthage all her hopes."—There were many other famous Carthaginians of this name, whose history is blended with that of the Romans.

ASEKI, or ASEKAI, the name which the Turks gave to the favourite sultanesses who have brought forth sons. These are greatly distinguished above others in their apartments, attendants, pensions, and honours, and have even sometimes shared the government.

ASELLI, a name given to two small stars in Cancer.

ASELLII PANCREAS. See PANCREAS.

ASH. *s* (æsc, Saxon.) A tree. See FRAXINUS.

ASH MOUNTAIN. See SORBUS.

ASH POISON. See RHUS.

ASHBORN, a town in Derbyshire, with a market on Saturdays. Lat 53 3 N. Lon. 1. 44 W.

ASHBURTON, a town in Devonshire, having markets on Tuesdays and Saturdays. Lat 50 30 N. Lon. 3 50 W.

ASHBY DE LA ZOUCH, a town in Leicestershire, with a market on Saturdays. Lat 52 42 N. Lon 1 25 W.

A'SH COLOURED. *a* (from *ash* and *colour*.) Coloured between brown and gray (*Wood*.).

ASHA'MED. *a*. (from *shame*.) Touched with shame (*Taylor*).

A'SHEN, *a*. (from *ash*.) Made of ash wood (*Dryden*).

A'SHES. *s*. *wants the singular* (asca, Saxon.) 1. The remains of any thing burnt (*Digby*). 2. The remains of the body (*Pope*).

ASHES. This term, though it formerly extended to the product of metallic bodies after combustion, is now properly confined to the pulverulent remains of vegetable and animal matters after burning. The ashes thus produced, when considered chemically, are found to contain a large proportion of the saline ingredient which yield those very important articles, the fixed alkalies, both vegetable and mineral—the former distinguished according to its species and purity by the terms wood-ashes, pearl-ash, potash of commerce, salt of tartar, or salt of wormwood, the latter by the terms natron, barilla, kelp, and soda. When the saline part of vegetable ashes has been separated by lixiviation, the light earth that remains is sometimes employed in the formation of the large cupels used in the refining of silver. The analysis of vegetable ashes has discovered in them silex, magnesia, lime, potash, soda; the sulphuric, carbonic, phosphoric, and muriatic acids; and the oxides of iron and manganese.

Animal matter is much more difficult of combustion than vegetable. The saline and earthy parts almost peculiar to animal ashes are the phosphates of soda, of ammonia, and of lime, and often the carbonates of soda and of lime. The animal matters from which ashes are produced are chiefly bone, horn, and shells. The ashes from bones when lixiviated, mixed with water, and cast in proper moulds, form the cupels that are employed in assaying and refining gold and silver.

Ashes of all kinds contain an alkaline salt, and are an excellent manure for cold and wet ground. They are also of considerable use in making lixiviums or lyes, for the purposes of medicine, bleaching, and for sugar works.

ASHFORD, a town in Kent, with a market on Saturdays. Lat 51 4 N. Lon. 0 59 E.

ASHKOKO, in zoology. See HYRAX SYRIACUS, and BRISTLY CAVY.

ASHLAR. *s*. (with masons.) Freestone as it comes out of the quarry.

A'SHLERING. *s*. (with builders.) Quartering in garrets. Builder's Dict.

ASHMOLE (Elias), a great antiquary and herald, founder of the Ashmolean museum at Oxford, was born at Lichfield in Staffordshire, 1617. In the early part of his life he practised in the law; and in the civil war had a captain's commission under the king, and was also comptroller of the ordnance. He married the lady Mainwaring in 1649, and settled at London, where his house was frequented by all the learned and ingenious men of the time. Mr Ashmole was a diligent and curious collector of manuscripts. In the year 1650 he published

a treatise written by Dr Arthur Dee, relating to the philosopher's stone, together with another tract on the same subject, by an unknown author. About the same time, he was busied in preparing for the press a complete collection of the works of such English chemists as had till then remained in manuscript. This undertaking cost him great labour and expence; and at length the work appeared, towards the close of the year 1652. He proposed at first to have carried it on to several volumes, but he afterwards dropped his design, and seemed to take a different turn in his studies. He now applied himself to the study of antiquity and records: he was at great pains to trace the Roman road, which in Antoninus's Itinerary is called Bennevanna, from Weedon to Lichfield, of which he gave Mr Dugdale an account in a letter. In 1659 he began to collect materials for his history of the Order of the Garter, which he lived to finish, and thereby did no less honour to the order than to himself. In September following, he made a journey to Oxford, where he set about giving a full and particular description of the coins presented to the public library by archbishop Laud.

Upon the restoration of king Charles II. Mr Ashmole was introduced to his majesty, who received him very graciously, and on the 18th of June, 1660, bestowed on him the place of Windsor herald. A few days after, he appointed him to give a description of his medals, which were accordingly delivered into his possession, and king Henry VIII's closet was assigned for his use. On the 15th of February, Mr Ashmole was admitted a fellow of the Royal Society, and, on the 9th of February following, the king appointed him secretary of Surinam, in the West Indies. On the 19th of July, 1669, the university of Oxford, in consideration of the many favours they had received from Mr. Ashmole, created him doctor of physic by diploma, which was presented to him by Dr Yates, principal of Brazen Nose college. On the 8th of May, 1672, he presented his "Institution, Laws, and Ceremonies, of the most noble Order of the Garter," to the king, who received it very graciously, and, as a mark of his approbation, granted him a privy seal for 400l. out of the custom of paper. On the 26th of January, 1679, a fire broke out in the Middle Temple, in the next chamber to Mr Ashmole's, by which he lost a noble library, with a collection of 9000 coins, ancient and modern, and a vast repository of seals, charters, and other antiquities and curiosities, but his manuscripts and his most valuable gold medals were luckily at his house at Lambeth. In 1683, the university of Oxford having finished a magnificent repository near the theatre, Mr Ashmole sent thither his curious collection of rarities; which benefaction was considerably augmented by the addition of his manuscripts and library at his death, which happened at Lambeth, the 18th of May, in the 76th year of his age. He was interred in the church of South Lambeth in Surry, on the 26th of May, 1692, and a black marble stone laid over his grave, with a Latin inscription.

Besides the works which we have mentioned, Mr Ashmole left several which were published since his death, and some which remain still in manuscript.

ASHORE. *a.* (from *a* and *shore*.) 1. On shore; on the land (*Raleigh*). 2. To the shore, to the land (*Milton*).

ASH-WEDNESDAY, the first day of Lent, supposed to have been so called from a custom in the church, of sprinkling ashes that day on the heads of penitents then admitted to penance. See LENT.

A'SHWEED. *s.* (from *ash* and *weed*.) An herb.

A'SHY. *a.* (from *ash*.) Ash-coloured, pale, inclining to a whitish gray (*Shakspeare*).

ASIA, in geography, one of the four grand divisions, called quarters, of the earth, and inferior in size only to America, surpassing in extent Europe and Africa taken together, lies to the east of Europe. It was so called, if we are to believe the Greeks, curious in searching after the etymology of words, from Asia, daughter of Oceanus and Thetis; others say that it derived its name from Asius, the son of Atys, king of Lydia: while Bochart is of opinion, that it took its name from the Phenician word Asi, signifying the middle; but all this is mere conjecture. It was in Asia, according to the sacred records, that the allwise Creator planted the garden of Eden, in which he formed the first man and the first woman, from whom all mankind were to spring. Asia became the nursery of the world after the deluge, whence the descendants of Noah dispersed their various colonies into the other parts of the globe. It was in Asia that God placed his once favourite people, the Hebrews, whom he enlightened by revelations delivered by the prophets, and to whom he gave the oracles of truth. It was here that the great and merciful work of our redemption was accomplished by his divine Son, and it was from hence that the light of his glorious Gospel was carried, with amazing rapidity, into all the known nations of the earth, by his disciples and followers. Many of the greatest empires have been established in this part of the world: first, the empire of the Chaldeans or Assyrians, then that of the Medes, founded by Arbaces, which ended in Astyages; from whom it was removed to the Persians by Cyrus, until the death of Darius; then to the Greeks or Macedonians, under Alexander the Great; after him the Parthians, the Persians, the Turks and Saracens, and the Moguls have each been powerful. At present it is divided into seven principal parts, Asiatic Turkey, Arabia, Persia, India, China, Tartary, and Siberia, to which may be added, a great number of islands. Asia is bounded on the north by the Frozen Sea, on the east by the North Pacific Ocean and the sea of China, on the south by the Indian and Arabian Seas, on the west it is separated from Africa by the Red Sea, and the Isthmus of Suez, and from Europe by the Archipelago,

the Straits of Gallipoli, the Sea of Marmora, the Straits of Constantinople, the Black Sea, and from thence by an imaginary line to the Frozen Ocean, between 60 and 70 degrees of E Lon from London. Its supposed extent is about 1600 leagues from the Straits of Gallipoli in the west, to the eastern shore of Tartary, and near 1500 from the southern extremity of Malacca, to the Frozen Ocean There must be a great variety of climates in a country of so vast an extent, as well as soil and produce; yet on the whole, if we except part of Arabia and Tartary, and some of the more northern tracks, it is in general rich and fruitful, and some parts of it exceedingly so

The principal religions of Asia are, the Christian, the Mahomedan, the Pagan, and that of Confucius The Christian religion is professed in some parts of Asiatic Turkey, part of Little Tartary, the north-west part of Persia, and by the Russians in Siberia The Mahomedan is established in Arabia, Persia, Little Tartary, Bukaria, and the Mogul's empire The Pagan religion, wherein the worship of the Deity is mixt with that of idols, is professed by the bulk of the inhabitants of the Mogul's empire, in both the Peninsulas of India, in China and Siberia, in the islands of Asia, in all Western Tartary, in Tibet, and in all the countries between India and China The religion of Confucius is established in China

The languages of Asia are very numerous, and therefore we shall only mention the chief The principal of Turkey in Europe are, the Grecian and Turkish, the Armenian is spoken in part of Turkey in Asia, and Persia, the Arabic is the only tongue in Arabia, and is spread over part of Turkey in Asia, as a learned language The Persian is used in Persia, and the court of the great mogul The Indian is spoken in India, by the ancient inhabitants of that country The Malayan language is common on the coast of India, and in some of the islands The Siamese in Siam, the Tibetian in Tibet, the Manchew in China and Eastern Tartary, and the Tartarian in Great Tartary Besides these, there are several distinct languages in Siberia, and the islands of Asia.

The principal rivers of Asia are, the Euphrates and Tigris, in Turkey, the Indus and Ganges, in India, the Kiang and Hoang-ho, in China, the Sir Amu and Wolga, in Western Tartary, the Saghalia Ula or Amur, in Eastern Tartary, the Irtish, Oby, Jenisea, and Lena, in Siberia The lakes are, that prodigious one called the Caspian Sea, and near that another very large one, called the lake Aral The Baykal is in Siberia, the Kokonor near Tibet, and the Tong Ping in China The chief mountains are, the Taurus in Turkey and Persia, the Imaus between India and Tibet, and the Altay, in Tartary.

The Asiatic islands are very numerous, some reckoning one hundred and fifty thousand; but of this there is no certainty Those that lie on the east of Asia are, the islands of Jesso or Yedso, and Japan, with several small ones on the coast of Korea, the island of Formosa, and the Philippines. Those on the west are, the island of Cyprus, in the Mediterranean; Scanderoon, off Natolia, and the isle of Rhodes, off Phischio, on the same coast. Those on the south are, the isles of the Maldives, in the Indian Sea, the isle of Ceylon, off cape Komorin, with a great many small ones in the gulph of Bengal. Those on the south-east are, the isles of Sandi, as Sumatra, the isles of Java, Borneo, &c

Asia Minor. See Natolia

Asia Proconsular, so called because it was governed by a proconsul, comprehended, according to Augustus's distribution of the provinces of the Roman empire, Lydia, Ionia, Caria, Mysia, Phrygia, and the proconsular Hellespont.

Asia, in mythology, was one of the nymphs called Oceanides, and according to Diodorus, the wife of Japetus.

ASIATIC, in a general sense, any person or thing that bears relation to Asia

ASIATICA, in entomology, a species of chrysomela, found in Siberia.

A'SIDE *ad.* (from *a* and *side.*) 1. To one side (*Dryden*) 2 To another part (*Boyle*). 3 From the company (*Mark*)

Aside, in the drama, something said by an actor, which some, or even all the other actors present, are supposed not to hear, a circumstance justly condemned as being unnatural and improbable

ASILUS. In zoology, a genus of the class insecta, order diptera. Mouth with a horny, projecting, straight, two-valved sucker, gibbous at the base antennas filiform approximate, of two articulations: body oblong, conic. Seventy-three species, scattered over the globe; which prey on other insects, especially those of the dipterous and lepidopterous orders

ASINARII, an appellation given, by way of reproach, to the ancient Christians, as well as Jews, from a mistaken opinion, among heathens, that they worshipped an ass. The appellation was originally given to the Jews, and only became applied to the Christians

A'SINARY. *a* (*asinarius*, Lat.) Belonging to an ass

A'SININE *a.* (from *asinus*, Lat.) Belonging to an ass (*Milton*)

ASINUS, in zoology, (see Equus,) under which it ranks as a species, viz. e. asinus.

ASITIA, (ασιτια, from α priv and σιτος food.) Loss of appetite, loathing of food.

To ASK. *v. a* (ascian, Saxon.) 1 To petition, to beg (*Swift*). 2. To demand, to claim (*Dryden*). 3 To inquire, to question (*Jeremiah*). 4. To require, as needful (*Addison*).

ASKA'NCE, Aska'unce. *ad.* Sideways, obliquely (*Milton*).

ASKA'UNT *ad* Obliquely; on one side (*Dryden*).

A'SKER. *s* (from *ask*.) 1 Petitioner (*South*). 2 Inquirer (*Digby*)

A'sker. *s* A water newt.

ASKE'W *ad* (from *a* and *skew*.) Aside; with contempt, contemptuously (*Prior*).

ASKEYTON, a market-town, and, until

the union, a borough town of Ireland, lying in the county of Limerick, on the river Deel. It is famous for its castle and beautiful abbey Lat. 52. 24 N. Lon 8. 54 W

ASKRIG, a town in the N riding of Yorkshire, with a market on Thursdays. Lat 54. 55 N Lon 1 0 W

To ASLAKE. *v a* (from *a* and *slake*, or *slack*) To remit; to slacken obsolete (*Sp*)

ASLANI, a name given to the Dutch dollar current in the Levant. Its value is about 120 aspers.

ASLANT. *ad.* (from *a* and *slant*.) Obliquely, on one side (*Dryden*)

ASLEEP *a* (from *a*. and *sleep*.) 1 Sleeping, at rest (*Dryden*) 2 To sleep (*Milton*)

ASLOPE *ad.* (from *a* and *slope*) With declivity, obliquely (*Bacon*).

ASMONEANS, in ancient history, the Maccabees

ASNA, a town of Upper Egypt, seated on the river Nile, near the cataracts The inhabitants, who are Arabs, carry on a considerable trade with the people of Nubia by means of the Nile, and the caravans that pass over the deserts. Lat 24. 45 N Lon 31 40 E.

ASOPH, a town of Coban Tartary, in Asia, seated on the river Don N. lat 47. 18 E Lon 41 30.

ASOPUS, a town of Laconia, in which was a temple of Minerva Cyparissensis, southeast of Cyparissa.

ASP, or ASPIC, in zoology, a species of COLUBER, which see

ASP, or ASPEN TREE. See POPULUS

ASPALATHI LIGNUM See LIGNUM ALOES.

ASPALATHUS, African-broom a genus of the class and order diadelphia, decandria Calyx five-cleft, the upper division larger, legume coated, downless, one or two-seeded Sixty species, all natives of the Cape, except the a orientalis and a arborea, the former of which is common to the East, and the latter a tree of Cochinchina, with weak, reclining branches and white flowers.

ASPALAX, a species of mus, called by Pennant the Daurian rat Dr. Shaw says it agrees in form and manners with the mus Talpinus, or blind rat.

ASPALTUM. See ASPHALTUM

ASPARAGIN, a name given to a lately discovered juice of asparagus, which was discovered by expression and evaporation Various crystals gradually make their appearance, and among others crystals of asparagin easily separated from the rest on account of their colour and figure The crystals are white and transparent, and have the figure of rhomboidal prisms: it is hard and brittle, and its taste is cool and slightly nauseous, so as to occasion a secretion of saliva. It dissolves in hot water, but not in alcohol. The aqueous solution does not affect vegetable blues. Neither infusion of galls, acetate of lead, oxalate of ammonia, [illegible], nor the hydrosulphurat, occasions any change in it When triturated [illegible] heated it swells, and emits penetrating vapours, affecting the eyes and nose like the smoke of wood. Nitric acid dissolves it with the evolution of nitrous gas. These properties distinguish it from all other vegetable substances *British Encyclopedia*

ASPARAGUS. The first tender sprout, or young shoot of an herb from the ground, before any leaves unfold themselves (*Ray*)

ASPARAGUS. (ἀσπαραγος, *a young shoot with unfolded leaflets*) Sperage: a genus of the class and order hexandria monogynia Corol six-cleft, erect, equal, calyxless, style very short, three-cleft, berry superior, three-celled, with two seeds in each Twenty species, natives chiefly of the south of Europe, the Cape and East Indies The a officinalis is the only native of our own country it is found wild on our coasts, and is cultivated with much improvement in our gardens, which also exhibit many of the other species

ASPARAGUS (Climbing African) See MEDEOLA

ASPASIA, a daughter of Hermotimus of Phocæa, famous for her personal charms and elegance She was priestess of the sun, mistress to Cyrus, and afterwards to his brother Artaxerxes, from whom she passed to Darius She was called Milto, Vermillion, on account of the beauty of her complexion (*Ælian*) Another woman, daughter of Axiochus, born at Miletus She came to Athens, where she taught eloquence, Socrates was proud to be among her scholars She so captivated Pericles by her mental and personal accomplishments, that he became her pupil, and at last took her for his mistress and wife He was so fond of her, that he made war against Samos at her instigation (*Plut*)

ASPASTICUM (from ἀσπαζομαι, *I salute*) In ecclesiastical writers, a place, or apartment, adjoining to the ancient churches, wherein the bishop and presbyters sat, to receive the salutations of the persons who came to visit them, desire their blessing, or consult them on business

A'SPECT *s* (*aspectus*, Lat) 1 Look, air, appearance (*Burnet*) 2 Countenance, look (*Pope*) 3 Glance, view, act of beholding (*Milton*) 4 Direction toward any point, position (*Sw*). 5 Disposition of any thing to something else, relation (*Locke*).

ASPECT, in astronomy, denotes the situation of the planets and stars with respect to each other There are five different aspects 1 Sextile aspect is when the planets or stars are 60° distant, and marked thus ✱ 2 The quartile, or quadrate, when they are 90° distant, marked □ 3 Trine, when 120° distant, marked △ 4 Opposition, when 180° distant, marked ☍ And, 5 Conjunction, when both in the same degree, marked ☌ Kepler, who added eight new ones, defines aspect to be the angle formed by the rays of two stars meeting on the earth, whereby their good or bad influence is measured, for it is to be observed, that these aspects being first

introduced by astrologers, were distinguished into benign, malignant, and indifferent; the quartile and opposition being accounted malign, the trine and sextile, benign or friendly; and the conjunction, indifferent

Aspect (double), in painting, is used where a single figure is so contrived, as to represent two or more different objects, either by changing the position of the eye, or by means of angular glasses

Aspect, in a military sense, is the view or profile of land or coast, and contains the figure or representation of the borders of any particular part of the sea These figures and representations may be found in all the rutters or directories for the sea-coast The Italians call them *demonstratione* By means of this knowledge you may ascertain whether the land round the shore is high, if the coast itself is steep or sloping, bent in the form of an arc, or extended in straight lines, round at the top, or rising to a point Every thing, in a word, is brought in a correct state before the eye, as far as regards harbours, bogs, gulphs, adjacent churches, trees, windmills, &c

Aspect (menacing) An army is said to hold a menacing aspect, when by advanced movements or positions it gives the opposing enemy cause to apprehend offensive operations

Aspect (military) A country is said to have a military aspect, when its general situation presents appropriate obstacles or facilities for an army acting on the offensive or defensive

Aspect (imposing) An army is said to have an imposing aspect, when it appears stronger than it really is This appearance is often assumed for the purpose of deceiving an enemy, and may not improperly be considered as a principal feint in war

To Aspe'ct *v a* (*aspicio*, Lat) To behold not used (*Temple*)

ASPE'CTABLE *a* (*aspectabilis*, Lat) Visible, being the object of sight (*Ray*)

ASPE'CTION *s* (from *aspect*) Beholding, view (*Bacon*)

A'SPEN, or ASP *s* (espe, Saxon) A tree, the leaves of which always tremble (*Spenser*) See Populus

A'spen *a* (from *asp* or *aspen*) 1 Belonging to the asp-tree (*Gay*) 2 Made of aspen wood

ASPER, a small Turkish silver coin, value about ½*d* English

Asper *a* (Lat) Rough, rugged (*Bacon*)

Asper, in grammar, an accent peculiar to the Greek language, marked thus ( ), and importing, that the letters over which it is placed ought to be strongly aspirated, or pronounced as if an *h* were joined with them

It is very doubtful whether this aspiration was in use in the time of the Apostles: and it becomes much more doubtful when we consider, that the most ancient versions of the New Testament so frequently confound αὐτὸς with αὑτὸς, that both words seem to have been written without an asper See Marsh's Michaelis, vol ii p 522, See also Aspirate

ASPERA ARTERIA See Trachea.

To A'SPERATE *v a* (*aspero*, Lat) To make rough or uneven (*Boyle*)

ASPERA'TION *s* (from *asperate*) A making rough

ASPERGILLUM, in antiquity, a long horse-hair brush, fixed to a handle, wherewith the lustral water was sprinkled on the people

ASPERIFOLIÆ (rough-leaved) The name of the 43d order in Linneus's Fragmenta, and of the 41st in his Ordines Naturales. Ray and others have the same natural order.

ASPERIFO'LIOUS *a* (*asper* and *folium*, Lat) Plants so called from the roughness of their leaves

ASPE'RITY *s* (*asperitas*, Lat) 1. Unevenness, roughness of surface (*Boyle*) 2 Roughness of sound 3 Roughness or ruggedness of temper, moroseness, sourness (*Rogers*)

ASPERNA'TION *s* (*aspernatio*, Lat) Neglect, disregard

A'SPEROUS *a*, (*asper*, Lat) Rough; uneven (*Boyle*)

To ASPE'RSE *v a* (*aspergo*, Lat) To bespatter with censure or calumny (*Swift*)

ASPE'RSION *s* (*aspersio*, Lat) 1 A sprinkling (*Shakspeare*) 2 Calumny; censure (*Dryden*)

ASPERUGO Wild buglos, goose-grass, or madwort a genus of the class and order pentandria, monogynia Calyx of the fruit compressed, its two margins flat, and parallel, sinuate Two species a procumbens, common to our own wastes, and a ægyptiaca, a native of Egypt

ASPE'RULA Woodroof, a genus of the class and order tetrandria, monogynia Corol one-petalled, funnel form seeds two globular Eleven species, chiefly of European birth, and two natives of our own country a odorata, found in our woods, and a cynanchica, on the dry sunny banks of our fields Asperula odorata is the systematic name for the officinal matrisylva See Matrisylva

ASPHALITES, in anatomy, the fifth vertebræ of the loins It is thus called because it is thought to be the support of the whole spine of the loins, being derived from the privative *a* and σφαλλω, *I supplant*

ASPHALT See Bitumen

ASPHA'LTICK *a* (from *asphaltos*) Gummy, bituminous (*Milton*)

ASPHALTITES, so called from the great quantity of bitumen it produces, called also the *Dead Sea*, and from its situation, the *East Sea*, the *Salt Sea*, the *Sea of Sodom*, the *Sea of the Desert*, and the *Sea of the Plain*, by the sacred writings: a lake of Judea A part of this lake was formerly the vale of Siddim, on which stood Sodom, Gomorrha, &c It abounds with bituminous substances See *Wells's Geography*, vol 2 p 145

ASPHALTUS, Asphaltum (Ασφαλτος, from ασφαλτιτις, a lake in Judea, where it was produced) Jews pitch, or bitumen of Judea called also *funeral gum*, *amber of Sodom*, *mineral pitch*, &c It is a black bituminous sub

stance, ponderous, solid, and considerably brilliant. It breaks easily, and its fracture is vitreous. When a thin plate of it is held between the eye and the light, it appears red It has no smell when cold, and but a faint one when rubbed. It is found on the waters of the lake Asphaltites, or the Dead Sea, in Judea, near which stood the ancient cities of Sodom and Gomorrha, and the inhabitants of the neighbourhood collect it for sale Many lakes in China afford this mineral.

The origin of asphaltus, like that of the other bitumens, is uncertain, various opinions have been entertained on the subject, and among the rest, that this bitumen is nothing but amber altered by subterraneous fire The analogy of these two substances is, however, by no means determined

Asphaltus, when exposed to fire, becomes liquid, swells, and burns with a thick flame and smoke, the smell of which is strong, acrid, and disagreeable By distillation, it affords a coloured oil, and an acid phlegm It is used by the Arabians and Indians in the same manner as pitch for coating their vessels, and by the Chinese for varnishes For the purposes of sale it is sometimes mixed with pitch, but the fraud may be detected by means of alcohol, which dissolves the pitch, but produces no change on the asphaltus See Bitumen

ASPHODEL See Asphodelus

Asphodel (African) See Authericum

Asphodel (lily) See Hemerocallis

Asphodel (lily) See Crinum

ASPHODELUS (*Asphodelus*, ἀσφόδελος, from ἀσπίς, *a serpent*, and δειλός, *fearful*, because it destroys the venom of serpents or from σποδός, *ashes*, because it was formerly sown upon the graves of the dead) Daffodil, Asphodel, or king's spear a genus of the class and order hexandria, monogynia. Corol six-parted, nectary consisting of six valves covering the germ Seven species, all of European origin and chiefly of warm climates Asphodelus racemosus; caule nudo, foliis ensiformibus carinatis laevibus, of Linnéus, was formerly supposed to be efficacious in the cure of sordid ulcers. It is now wholly laid aside

Asphodelus racemosus The systematic name for the officinal asphodelus See Asphodelus.

ASPHYXIA. (*asphyxia*, ἀσφυξία, from *a*, priv. and σφύξις, *a pulse*.) The state of the body during life, in which the pulsation of the heart and arteries cannot be perceived. There are several species of asphyxia enumerated by different authors

ASPIDIUM, in botany, a genus of the class and order cryptogamia, filices. Fructification in roundish scattered dots, not marginal involucre umbilicated, opening nearly all round. Seventy-three species of this fern, which may ... those ... simple or trifoliate frond ... frond ... doubly or triply pinnate. ... in ancient geography, a powerful people of India, whom Alexander defeated in a pitched battle near the river Eccaspla

ASPIRATE, Aspiratio, in grammar, a character used to denote an aspiration

The *aspirate*, by the Greeks called *spiritus asper*, and marked over their vowels, seems to be of a very different nature from the letters, but is nevertheless a true letter, as well as the rest, and a real consonant —By letters we do not mean the characters of the alphabet, which are changeable according to the languages and the people, and among the same people, according to time and custom, and even according to the fancy of particular persons Thus, some, for instance, write the aspirates, or letters aspirated, which by others are omitted, though both the one and the other pronounce alike as in *huomo*, *huomini*, an Italian word frequently written *uomo*, *uomini* But, by letters, we here mean articulate sounds, marked by them, and formed by the organs of speech, viz the throat, mouth, tongue, palate, teeth, &c

Now an aspirate is an effect or consequence of a motion made by some of the organs of speech, and therefore it must either be a vowel or a consonant The former it cannot be, as not being a simple sound, or a sound that may be pronounced by itself It must therefore be a modificative, or consonant, and in effect it has all the properties of one

For, 1st It results from a motion of the organ, which, of itself, produces no sound Thus the *spiritus* of the Greeks, our *h aspirate*, as well as that of the French, and other people, has no more sound of itself, than *b*, *c*, *d*, &c and the same thing may be observed of the *aleph*, *bheth*, and *caph*, of the eastern languages.

2dly On the contrary, our *h*, the *spiritus* of the Greeks, and the other *aspirates* just mentioned, are pronounced with all the vowels, in the same manner as consonants are They modify those vowels, and are effects of a motion of the organ superadded to the motion necessary to form the vowel Thus, to pronounce *ha*, two operations of the organ are required as well as for *ba*, or *ca*, &c; one for *a*, which itself is a sound, the other for *h*, which yields no sound, no more than *b*, but adds something to *a* which modifies it, and makes that *ha* is not mere *a*, nor *ba*, nor *ca*, &c And this must hold still more sensibly in the stronger *aspirates*, as those of the oriental tongues א, ה, ח, ע, ב, כ, &c in all which, there are evidently two motions, the one to express the vowel, and the other to modify it: now this being the nature and essence of a consonant, it follows, that let them be denoted in what manner they will, whether as our *h*, as the orientals do, i e by proper characters in the course of the words themselves, or, as the Greeks do some of theirs, by a sign of aspiration placed over the vowel, it matters not The *aspirate* is no less a consonant in ἀίρω, than in χαίρω; in ἴω, than in χίω; in ὕλη, than in χολή, and so of others

The third and last reason urg'd by some, is,

that the eastern languages, which, according to them, do not express the vowels, do yet express the aspirates. This kind of argument seems, however, to be grounded on a mistake, since it is more than probable, that the א, ה, ו, ע of those languages should be ranked among the vowels, and were so used.

Add, that the aspirate is frequently changed into a consonant, and expressed by a consonant. Thus, of ἕξ is made *sex*, of ἑπτὰ, *septem*, of ἑσπερος, *vesperus*, &c. of the Hebrew יין, ὄινος, and thence *vinum*, &c. Nay, even in the same language, Hesiod, speaking of Hercules's buckler, uses Ηρων for Θηρων, making no difference between ι Θ and an *aspirate*.

Hence it follows, that aspirates are real consonants, and that we ought not to exclude the *h* in our language out of the number of letters.

To A'SPIRATE *v. a.* (*aspiro*, Lat.) To pronounce with aspiration, or full breath.

To A'SPIRATE *v. n.* To be pronounced with full breath (*Dryden*).

ASPIRATE *a.* (*aspiratus*, Lat.) Pronounced with full breath (*Holder*).

ASPIRA'TION *s.* (*aspiratio*, Lat.) 1. A breathing after; an ardent wish (*Watts*). 2. The act of aspiring, or desiring something high and great (*Shakspeare*).

ASPIRATION, the act of aspirating, i. e. of pronouncing any syllable, or word, strongly, with a good deal of breath and vehemence.

This we do, for instance, in those words which have the letter *h* before them, as *harangue*, *hook*, *Holland*, *hero*, &c.; whereas the like syllables are sounded much softer and easier without the *h*, as in the words *ear*, *eat*, &c. See H.

To ASPI'RE *v. n.* (*aspiro*, Lat.) 1. To desire with eagerness, to pant after something higher (*Davies*). 2. To rise high (*Waller*).

ASPI'RER. *s.* (from *aspire*.) One who ambitiously strives to be greater than he is (*Milton*).

ASPLE'NIUM. Spleenwort, or milt-waste, a genus of the class and order cryptogamia, filices. Fructification in straight scattered lines, involucre originating laterally from a vein opening towards the tip. Of this fern there are fifty-nine species, which may be subdivided into those,

A with undivided frond.
B frond divided.
C pinnatifid.
D. pinnate.
E. doubly pinnate.

ASPLENIUM RUTA MURARIA. The systematic name for the ruta muraria of the pharmacopœias. See RUTA MURARIA.

ASPLENIUM SCOLOPENDRIUM. The systematic name for the scolopendrium of the pharmacopœias. See SCOLOPENDRIUM.

ASPLENIUM TRICHOMANES. The systematic name for the trichomanes of the pharmacopœias. See TRICHOMANES.

ASPORTA'TION *s.* (*asportatio*, Latin.) A carrying away.

ASPRONISI, a small island in the harbour of Megali Camini, on the island of Santorin, in the Mediterranean. It rose out of the sea in the first century after the birth of Christ.

ASQUI'NT *ad.* (from *a* and *squint*.) Obliquely, not in the straight line of vision (*Swift*).

ASS, in zoology, a species of equus. See ASINUS and EQUUS.

Coronation of the Ass, in antiquity, was a part of the ceremony of the feast of Vesta, wherein the bakers put bread-crowns on the heads of these quadrupeds; Ecce coronatis panis dependet asellis. Hence, in an ancient calendar, the ides of June are thus denoted; Festum est Vestæ. Asinus coronatur.—This honour, it seems, was done the beast, because, by its braying, it had saved Vesta from being ravished by the Lampsacan god. Hence this formula, Vestæ delicium est asinus.

ASS, feast of, a festival, celebrated during the dark ages, in commemoration of the Virgin Mary's flight. On this occasion, a young girl, richly dressed, with a child in her arms, was set upon an ass. The beast was led to the altar, where mass was said with great pomp. The ass was taught to kneel, and a hymn was sung in his praise. As soon as the ceremony was ended, the priest and the people brayed in imitation of the ass. This was esteemed an act of devotion, and performed by authority of the church.

ASSA. See ASA.

ASSAC. (*Asac*, Arab.) Gum-ammoniac.

ASSAD, the name given by some Arabic writers to the lion.

ASSA-FÆTIDA. See ASA-FŒTIDA.

ASSAI, in music, is always joined with some other word, to lessen or weaken its signification, for example, if it be added to any of the words, Adagio, Grave, or Largo, which all denote a slow movement, it signifies that the music must be performed not so slow as each of these words would require if alone; but if it be joined with any of these words, Vivace, Allegro, or Presto, which all denote a quick movement, then it signifies that the musick must not be performed quite so brisk or quick as each of these words would require if alone.

To ASSA'IL. *v. a.* (*assailer*, French.) 1. To attack in a hostile manner; to assault; to fall upon, to invade (*Spenser*). 2. To attack with argument, or censure (*Pope*).

ASSA'ILABLE *a.* (from *assail*.) That may be attacked (*Shakspeare*).

ASSA'ILANT. *s.* (*assaillant*, Fr.) He that attacks (*Hayward*).

ASSA'ILANT *a.* Attacking, invading (*Milt.*).

ASSA'ILER. *s.* (from *assail*.) One who attacks another (*Sidney*).

ASSAM, a country of Asia, bounded on the W. by Bengal and Bootan, on the N. by the mountains of Thibet, and on the S. E. and S. by Meckley. The river Burrampooter flows through the whole length of it. Its capital is Ghergon. The natives prefer the flesh of dogs to any other kind of animal food. They pay no taxes, the king being the sole proprietor of all the gold, silver, and other metals, found in his kingdom. They live comfortably, almost

each housekeeper having an elephant, for the conveniency of his wives. The invention of gunpowder is ascribed to the Assamese. It is certain, that gunpowder was known in China and Hindostan, far beyond all periods of investigation; and in the code of Gentoo laws is a prohibition of the use of fire-arms. Assam lies between 91 and 96 E. lon. and 25 and 28 N. lat.

ASSAPANICH, a name sometimes given to the flying squirrel.

ASSAR, in geography, a river of Abyssinia, which is the largest river Mr. Bruce saw except the Nile.

ASSARIUM, a small copper coin, being a part or diminutive of the as.

ASSARON, or OMER, a measure of capacity, in use among the Hebrews, containing five pints. It was the measure of manna which God appointed for every Israelite.

ASSA'RT. s. (essart, French.) An offence committed in the forest, by plucking up woods by the roots (*Cowell*).

ASSASIN, or ASSASSIN, a person who kills another with the advantage either of an inequality in the weapons, or by means of the situation of the place, or by attacking him unawares.

The word assassin is said by some to have been brought from the Levant, where it took its rise from a certain prince of the family of the Arsacidæ, popularly called Assassins, living in a castle between Antioch and Damasco, and bringing up a number of young men, ready to pay a blind obedience to his commands; whom he employed in murdering the princes with whom he was at enmity. But according to Mr. Volney, the word Hassassin (from the root hass, to kill, to assassinate, to listen, to surprise), in the vulgar Arabic signifies robbers of the night, persons who lie in ambush to kill; and is very universally understood in this sense at Cairo and in Syria. Hence it was applied to the Batenians, who slew by surprise.

ASSASSINS, a tribe or clan in Syria, called also Ismaelians and Batanists or Batenians. These people properly owed their origin to the Karmatians, a famous heretical sect among the Mahometans, who settled in Persia about the year 1090; whence, in process of time, they sent a colony into Syria, where they became possessed of a considerable tract of land among the mountains of Lebanon, extending itself from the neighbourhood of Antioch, to Damascus. The first chief and legislator of this remarkable tribe appears to have been Hassan Sabah, a subtle impostor, who by his artifices made fanatical and implicit slaves of his subjects. Their religion was compounded of that of the Magi, the Jews, the Christians, and the Mahometans, but the capital article of their creed was to believe that the Holy Ghost resided in their chief, that his orders proceeded from God himself, and were real declarations of his divine pleasure. To this monarch the orientals gave the name of Scheik; but he is better known in Europe by the name of the Old Man of the Mountain.

ASSA'SSINATE. s. (from assassin.) The crime of an assassin; murder (*Pope*).

* To ASSA'SSINATE. v. a. (from assassin.) 1. To murder by violence (*Dryden*). 2. To waylay; to take by treachery (*Milton*).

ASSASSINA'TION. s. (from assassinate.) The act of assassinating; murder (*Clarendon*).

ASSASSINA'TOR. s. (from assassinate.) Murderer; mankiller.

ASSA'TION. s. (assatus, roasted, Lat.) Roasting (*Brown*).

ASSA'ULT. s. (assault, French.) 1. Assault opposed to defence (*Shaks.*) 2. Storm opposed to sap or siege (*Bacon*). 3. Hostile violence (*Spenser*). 4. Invasion; hostility; attack.

ASSAULT, in law, is an attempt to offer to beat another, without touching him: as if one lifts up his cane or his fist in a threatening manner at another, or strikes at him, but misses him; this is an assault, insultus, which Finch describes to be "an unlawful setting upon one's person." This is also an inchoate violence, amounting considerably higher than bare threats, and therefore, though no actual suffering is proved, yet the party injured may have redress by action of trespass vi et armis, wherein he shall recover damages as a compensation for the injury.

To ASSA'ULT. v. a. (from the noun.) To attack; to invade (*Dryden*).

ASSA'ULTER. s. (from assault.) One who violently assaults another (*Sidney*).

ASSAY, or ESSAY, called in ancient statutes, the touch, is the proof or trial of the goodness of money, or the purity of wrought gold and silver utensils, and the method still in use for these purposes was first established by an act of the English parliament in 1354. In a more enlarged sense,

ASSAYING, in metallurgy, or the docimastic art, is used to express those chemical operations which are made in small to ascertain the quantity of metal contained in ores, or to discover the value or purity of any mass of gold, silver, or any other metal. This mode of examination differs from analysis in being principally concerned about only one of the ingredients in the ore or alloy, whereas the object of the latter is to ascertain the quantity and proportion of every substance in the mass to which it is applied. Thus in the assay of copper ores, the object is to know the proportion of pure metallic copper which a given weight of the ore can be made to yield, disregarding all the other component parts, such as the sulphur, iron, silex, &c. or, rather, confounding them together under the general term impurities. Thus also in the assay of a mixture of gold, or of gold and silver, with copper, lead, tin, or any other of the inferior metals, the whole attention is directed to the proportion of fine, or of gold and silver contained in the alloy.

In the assaying of ores, the methods differ in some respects according to the nature of the ore, or of the metal which it is supposed to contain. Each metal has its proper and improper ores,

which have peculiar characters and appearances, and from which persons accustomed to see them know pretty nearly what metal they will afford; but the general principles of the process are as follow.

As metals are very unequally distributed in their ores, it is necessary, for the purpose of guarding against false and deceitful assays, to take care that the proportionable quantity of metal produced by any assay shall be nearly the medium contained in the whole ore. This is effected by taking specimens from the several veins of the mine, if there be several, or from different places of the same vein, so that the selection shall consist, as nearly as can be judged, of the richest, the poorest, and those of a middle nature between the two. These are to be washed with water, which carries off a part of the gangue or matrix; and after being carefully weighed, roasted with due care, either in a small earthen pot covered over with another, or in a stone retort. When the ore has been kept red hot till it cease to exhale vapours, the roasting is finished. The residue is to be again weighed, that it may be known how much it has lost by the operation. After being roasted, the ore must next be melted, which is done by mixing it with three parts of black flux, and a little decrepitated common salt, enclosing the mixture in a crucible covered closely with a lid, and placing it in a good fusing furnace. When the fusion is finished, the contents of the crucible must be permitted to cool slowly. The fusion is known to be complete, if the metal be united in one lump, the upper surface of which is of a convex form, if no grains of it appear intermixed with the scoræ, and if the scoræ be compact, uniform, and vitreous, and covered over with a crust of melted marine salt. The lump of metal is to be carefully weighed, which discovers the proportion in which the metal exists in the ore. The instrument employed for the purpose of weighing, in these processes, is called an assay balance, a descrip- of which will be found under the word BALANCE.

But some ores are harder and more refractory than to yield to the method already mentioned. Fluxes of a more active, and those in greater quantity, must then be employed, such as borax, pounded glass, fixed alkali, &c. The same mineral often contains an intermixture of what are called imperfect and perfect metals, that is, of those whose properties are altered by being heated in the air, and of those which, under such circumstances, remain unchanged. These may be separated by heating the lump of metal in the air, by which the imperfect metal is converted to an oxide, and carried off, leaving the perfect metal in a state of purity. This operation bears the general name of refining. The perfect metal obtained by this process is almost always a mixture of gold and silver, which may be separated by a solvent which acts on silver, leaving the gold uninjured: this operation is called parting.

A method less accurate, but sometimes more readily applied, and of equal utility, is frequently made use of where great works are carried on. In this method cheaper materials are employed, and less caution is observed. The ore is assayed by melting it on coals in a fusing furnace: the coals reduce the metallic oxide, and the fixed alkali, which is produced as they burn, absorbs part of the mineralizer. It is sometimes found necessary to add a small quantity of filings or scoriæ, in order to facilitate the fusion of very refractory ores.

When it appears, from a particular assay, or a series of assays, that the working of a mine is likely to be profitable, a train of operations takes place, an account of which will be given under the word METALLURGY.

There is a method of assaying metals in the humid way, which may be employed to discover what metals are contained in pieces of ore meant to be laid up in collections of objects of natural history. A small bit broken off from the piece of ore, is digested among acids, which dissolve the metal, and separate the mineralizer. The salt produced by the union of the metal with the acid, shews the quantity of metal. But as all metals are not subject to the action of acids, only certain ores can be assayed in this manner. Bergman has written an excellent Dissertation on this subject, to which the reader may be referred with advantage.

These are the general principles and operations of assaying ores: how they are applied to the different ores, and what variations take place in different circumstances, will be seen under the articles which treat of the metals, a list of which will be given under the words ORE, and METAL.

We now proceed to the Assaying of Metals, the purpose of which is to ascertain their purity, and their fitness for different purposes in commerce and the arts. Different methods are necessary for the examination of the various metals, and these will be noticed under their respective names. It may, however, be proper to observe, in this place, that as gold and silver are of superior value, are used for the purposes of money and exchange, and are the materials of the most costly and splendid utensils and ornaments, they have obtained a greater accuracy in their assay than any other of the metallic bodies. These two metals, in a state of absolute purity, are unfit for many of the purposes of manufacture or coinage, and are too soft to sustain much wearing or circulation; they are therefore mixed or alloyed with other metals to make them firmer, and better for working; and it is one great object of assaying these metals to discover or assign the proportion of alloy to be mixed with them. This proportion is decided by legislative authority; and when the metal is reduced to its proper state, it is said to be of the standard goodness. See CARAT.

Assaying of Coins. The celebrated Klaproth has made a series of experiments to determine the composition of many ancient coins; from which it appears that the Greeks for their early coins employed in general a mixture of copper,

zinc, and lead; and that the Roman coins are of two kinds, one of which consists only of copper, and the other of a mixture of copper and zinc." The manner and results of these experiments are particularly detailed in Tilloch's Philosophical Magazine, vol xvii, p. 256.

To ASSA'Y *v. a.* (*essayer*, French) 1 To make trial of (*Hayward*). 2. To apply to, as the touchstone in assaying metals (*Milton*) 3. To try, to endeavour (*Samuel*)

ASSAY BALANCE. See BALANCE

ASSAY-MASTER, an officer, under certain corporations, entrusted with the care of making true touch, or assay, of the gold and silver brought to him; and giving a just report of the goodness or badness thereof Such is the assay-master of the mint in the Tower, called also assayer of the king The assay-master of the goldsmiths' company is a sort of assistant warden, called also a touch-warden, appointed to survey, assay, and mark all the silver work, &c. committed to him —There are also assay-masters appointed by statute, at York, Exeter, Bristol, Chester, Norwich, Newcastle, and Birmingham, for assaying wrought plate

ASSA'YER *s* (from *assay*) An officer of the mint, for the due trial of silver (*Cowel*)

ASSECTATION *s* (*assectatio*, Latin) Attendance, or waiting upon.

ASSECU'TION. *s.* (from *assequor*, *assecutum*, Lat. to obtain) Acquirement (*Ayliffe*)

ASSE'MBLAGE *s* (*assemblage*, French) 1. A collection, a number of individuals brought together (*Locke*) 2 The state of being assembled (*Thomson*)

To ASSE'MBLE *v a* (*assembler*, Fr) To bring together into one place (*Shakspeare*)

To ASSE'MBLE *v n.* To meet together (*Daniel*).

ASSE'MBLY *s* (*assemblée*, Fr) A company met together (*Shakspeare*)

ASSEMBLY, in the beau-monde, an appointed meeting of fashionable persons of both sexes, *for the sake of play, dancing, gallantry, conversation, &c.*

ASSEMBLY, in the military art, the second beating of a drum before a march, at which the soldiers strike their tents, roll them up, and stand to arms

ASSEMBLIES of the clergy are called convocations, synods, councils, the annual meeting of the church of Scotland is called a general assembly.

The General Assembly possesses the highest authority in the church of Scotland, a presbytery, composed of fewer than 12 parishes, sends two ministers and one ruling elder to this assembly; if it contain between 12 and 18 ministers, it sends three of these, and one ruling elder; if it contain between 18 and 24 ministers, it sends four ministers and two ruling elders; and of 24 ministers, it sends five with two ruling elders. Every royal borough deputes one ruling elder, and Edinburgh two, and their election must be attested by the kirk-session of their respective boroughs Every university sends one commissioner from its own body. The commissioners are chosen annually six weeks before the meeting of the assembly; and the ruling elders are often men of the first eminence for rank and talents In this assembly, which meets once a year, the king presides, by his commissioner, who is always a nobleman; but he has no voice in their deliberations

Assembly of Divines, is the name given to an association of ministers and others, summoned, by an ordinance of parliament, in the year 1643, to meet at Westminster, "for settling the government and liturgy of the church of England, and for vindicating and clearing the said church from false aspersions and interpretations" This assembly consisted of 121 divines and 30 laymen, "celebrated in their party" says Mr Hume, "for piety and learning" The several parties in this assembly were composed of Presbyterians, Erastians, and Independents The works of the assembly, besides some letters to foreign churches, and occasional admonitions, were 1 "Their humble advice to parliament, for ordination of ministers, and settling the presbyterian government" 2 "A directory for public worship" 3 "A confession of faith" 4 "A larger and a shorter catechism" 5 "A review of the thirty-nine articles"—"When some of the thirty-nine articles"—"When posterity," says Mr Neale, shall impartially review this assembly of divines, and consider the times in which they lived, they will have a just veneration of their memory, for, though their sentiments in divinity were in many instances too narrow and contracted, yet, with all their faults, amongst which their persecuting zeal for religion was not the least, they were certainly men of real piety and virtue, who meant well, and had the interest of religion at heart; and most of them possessed as much learning as any of their contemporaries" The excellent Richard Baxter, who knew most of them, says, "They were men of eminent learning, godliness, ministerial abilities, and fidelity; and being not worthy to be one of them myself," says he, "*I may more fully speak* the truth which I know, even in the face of malice and envy, that, as far as I am able to judge by the information of history, and by any other evidences, the christian world since the days of the apostles, had never a synod of more excellent divines than this synod, and the synod of Dort See further Clarendon's Hist vol 1 p 530 Hume's Hist vol vii p 32 Neal's Hist Pur vol ii p 35 &c p 345 4to

ASSENT, in a general sense, implies an agreement to something proposed or affirmed by another. The royal assent is the approbation given by the king to a bill in parliament, after which it becomes a law

Dr Hartley distinguishes assent into two kinds, rational and practical He defines Rational assent as a readiness to affirm a proposition to be true, arising from a close association of the ideas suggested by the proposition, with the idea, or internal feeling, belonging to the word truth, or of the terms of the proposition, with the word truth: Rational dissent is the

opposite to this Practical assent is a readiness to act in such manner as the frequent vivid recurrency of the rational assent disposes us to act, and practical dissent the contrary Practical assent is, therefore, the natural and necessary consequence of rational, when sufficiently impressed There are, however, two cautions to be subjoined, viz First, That some propositions, mathematical ones for instance, admit only of a rational assent, the practical not being applied to them in common cases Secondly, That the practical assent is sometimes generated, and arrives at a high degree of strength, without any previous rational assent, and by methods that have little or no connection with it Yet still it is, in general, much influenced by it, and, conversely, exerts a great influence upon it Hartley on Man, vol I p 325 See also Reid on Intellect Powers of Man p 353, for another theory

To ASSE'NT *v n* (*assentire*, Latin) To concede, to yield to (*Acts*)

ASSENTATION *s* (*assentatio*, Lat) Compliance with the opinion of another out of flattery or dissimulation

ASSENTMENT *s* (from *assent*) Consent (*Brown*)

ASSER, John (or ASSERIUS MENEVENSIS, that is, Asser of St David's), bishop of Shirburn in the reign of Alfred the Great He was born in Pembrokeshire, in South Wales, and educated in the monastery of St David's by the archbishop Asserius, who, according to Leland, was his kinsman In this monastery he became a monk, and by his assiduous application soon acquired universal fame as a person of profound learning and great abilities Alfred, the munificent patron of genius, about the year 880, sent for him to court The king was then at Dean in Wiltshire He was so charmed with Asser, that he made him his preceptor and companion As a reward for his services, he appointed him abbot of two or three different monasteries, and at last promoted him to the episcopal see of Shirburn, where he died, and was buried, in the year 910 He was, says Pits, a man of a happy genius, wonderful modesty, extensive learning, and great integrity of life He is said to have been principally instrumental in persuading the king to restore the university of Oxford to its pristine dignity and lustre —He wrote, De vita et rebus gestis Alfredi, &c Lond 1574, published by archbishop Parker, in the old Saxon character, at the end of Walsingham's hist —Francf 1602, fol Oxf 1722, 8vo Many other works are ascribed to this author by Gale, Bale, and Pits, but all doubtful

To ASSE'RT *v a* (*assero*, Latin) 1 To maintain, to defend either by words or actions (*Dryden*) 2 To affirm, to declare positively 3 To claim, to vindicate a title to (*Dryden*)

ASSE'RTION *s* (from *assert*) 1 The act of asserting 2 Position advanced (*Brown*)

ASSE'RTIVE *a* (from *assert*) Positive; dogmatical, peremptory (*Glanville*)

ASSE'RTOR *s* (from *assert*) Maintainer, vindicator, affirmer (*Prior*)

To ASSE'RVE *v a* (*asservio*, Latin) To serve, help, or second

ASSES CUCUMBER See MOMORDICA

ASSES MILK. This is preferred to cows and other kinds of milk in phthisical cases, and where the stomach is weak, as containing less oleaginous particles and being more easily converted into chyle It is more aqueous than human, goat's, cow's, or mare's, and contains more sugar than the goat's, sheep's, or cow's in this last respect it only yields to the mares, and human milk

ASSES, order of, a denomination of Mathurins, or Trinitarians, so called because they were obliged, in travelling, to ride on asses, not horses

To ASSE'SS *v a* (from *assestare*, Italian) To charge with any certain sum (*Bacon*)

ASSE'SSION *s* (*assessio*, Lat) A sitting down by one, to give assistance or advice

ASSE'SSMENT *s* (from *to assess*) 1. The sum levied on certain property 2 The act of assessing (*Howel*)

ASSE'SSOR *s* (*assessor*, Latin) 1 The person that sits by another, generally used of those who assist the judge (*Dryden*) 2 He that sits by another, as next in dignity (*Mil*) 3 (from *assess*) He that lays taxes

ASSETS, (Fr *assez*, i e *satis, enough*,) in law, signifies goods enough to discharge that burden which is cast upon the executor or heir, in satisfying the debts and legacies of the testator or ancestor Bro tit Assets Assets are real or personal, where a man hath lands in fee-simple, and dies seised thereof, the lands which come to his heir, are assets real, and where he dies possessed of any personal estate, the goods which come to the executor, are assets personal Assets are also divided into assets per descent, and assets inter maines assets by descent, is where a person is bound in an obligation, and dies seised of lands which descend to the heir, the land shall be assets, and the heir shall be charged as far as the land to him descended will extend assets inter maines, is when a man indebted makes executors, and leaves them sufficient to pay his debts and legacies, or where some commodity or profit ariseth to them in right of the testator, which are called assets in their hands

To ASSE'VER, *To* ASSE'VERATE *v a* (*assevero*, Lat) To affirm with great solemnity, as upon oath

ASSEVERA'TION *s* (from *asseverate*) Solemn affirmation, as upon oath (*Hooker*)

A'SSHEAD *s* (from *ass* and *head*) One slow of apprehension, a blockhead (*Shakspeare*)

ASSIDEANS, or rather HASIDEANS, in antiquity, a sect among the Jews, thus called from the Hebrew חסידים, hasidim, merciful, righteous The Assideans are recorded as holding works of supererogation, necessary They were the fathers and predecessors of the Pharisees; and from them likewise arose the Esseni

ASSIDU'ITY *s* (*assiduité*, Fr) Diligence (*Rogers*)

ASSI'DUOUS *a* (*assiduus*, Lat.) Constant in application (*Prior*)

ASSI'DUOUSLY *ad* (from *assiduous*) Diligently, continually (*Bentley*).

ASSIDUUS, or ADSIDUUS, among the Romans, denoted a rich or wealthy person. The word in this sense is derived from *as* assis, q. d. *a moneyed man*.

ASSIENTO, a Spanish word, signifying a farm, in commerce, is used for a bargain between the king of Spain and other powers, for importing negroes into the Spanish dominions in America, and particularly to Buenos Ayres. The first assiento was made by the French Guinea company, and by the treaty of Utrecht, transferred to the English, who were to furnish 4800 negroes annually.

To ASSI'GN *v n* (*assigner*, French) 1 To mark out, to appoint (*Addison*) 2 To fix with regard to quality or value (*Loc*) 3 (In law) To appoint a deputy, or make over a right to another (*Cowell*)

ASSIGN *s* A person to whom a thing is assigned, or made over.

ASSI'GNABLE *a* (from *assign*) That may be marked out, fixed, or made over (*South*)

ASSIGNA'TION *s* (*assignatio*, Latin) 1 An appointment to meet: used generally of love appointments (*Swift*) 2 A making over a thing to another.

ASSIGNE'E *s* (*assigné*, Fr) He that is appointed or deputed by another to do any act, or perform any business, or enjoy any commodity.

ASSIGNEES, under a commission of bankruptcy, are persons to whom the bankrupt's estate is assigned, for the benefit of the creditors.

ASSI'GNER *s* (from *assign*) He that appoints (*Decay of Piety*)

ASSI'GNMENT *s* (from *assign*) Appropriation of one thing to another thing or person (*Locke*)

ASSIGNMENT, the act of assigning, or transferring the interest or property a man has in any thing, or of appointing and setting over a right to another.

No estate of freehold or term for years shall be assigned, but by deed in writing signed by the parties, except by operation of law. Stat. 29 Car. II c 3. If lessee for years assigns all his term in his lease to another, he cannot reserve a rent in the assignment, for he hath no interest in the thing by reason of which the rent reserved should be paid, and where there is no reversion, there can be no distress: but debt may lie on it as on a contract. 1 Lill. abr 99. If an assignment is made by an assignee, the first assignee is not suable for the rent, for if he be accepted by the lessor, the admission of one assignee is the admission of twenty. Comp. Attorn 491. Bonds, &c. are assigned by power of attorney, to receive and sue in the assigner's name: but bills of exchange are assignable by indorsement, and the assignees may recover in their own names, by stat. 3 and 4 Ann, c 9.

The *assignment of a dower*, is the setting out of a woman's marriage-portion by the heir.

ASSI'MILABLE *a* (from *assimilate*) That may be converted to the same nature with something else (*Brown*)

To ASSI'MILATE *v n* (*assimilo*, Lat) To perform the act of converting food to nourishment (*Bacon*)

To ASSI'MILATE *v a* 1 To bring to a likeness, or resemblance (*Swift*) 2 To turn to its own nature by digestion (*Newton*)

ASSI'MILATENESS *s* (from *assimilate*) Likeness.

ASSIMILA'TION *s* (from *assimilate*) 1 The act of converting any thing to the nature or substance of another (*Bacon*) 2 The state of being assimilated, or becoming like something else (*Brown*)

ASSIMILATION, ASSIMILATIO, in physics, is properly a motion whereby bodies convert other duly disposed bodies into a nature like, or homogeneous to their own. Instances of this assimilation we see in flame, which converts the oily or other particles of fuel into its own fiery and luminous nature. The like also appears in air, smoke, and spirits of all kinds.

Some metaphysicians have recourse to a similar principle, to account for many operations of the human mind: and some medical men of eminence have contended, that an assimilation of disposition is necessary to a certain degree for the propagation of the human species, as is often observed where persons are married some years before they have children. See Jarrold's Reply to Malthus on Population.

ASSIMILATION, in medicine. See ANIMALIZATION.

ASSIMILIS. A species of Gryllus.

ASSIMILIS. A species of Sphex that inhabits Tranquebar.

ASSIMULATION, (*assimulatio*, from *ad*, and *similis*, to make like to) See ASSIMILATION.

ASSISE, in old English law books, is defined to be an assembly of knights, and other substantial men, together with a justice in a certain place, and at a certain time; but the word in its present acceptation implies a court, place, or time, when and where the writs and processes, whether civil or criminal, are decided by judge and jury.

All the counties of England are included in six circuits, and two judges are assigned by the king's commission, who hold their assises twice a year in every county (except London and Middlesex, where courts of nisi prius are holden in and after every term, before the chief or other judge of the several superior courts, and except the four northern counties, where the assises are taken only once a year,) to try by a jury of the respective counties the truth of such matters of fact as are then under dispute in the courts in Westminster-hall. These judges of assise came into use in the room of the ancient justices in eyre, justiciarii in itinere, who were regularly established, if not first appointed, by the parliament of Northampton, A D 1176, 22 Henry II. with a delegated

power from the king's great court or aula regia, being looked upon as members thereof and they afterwards made their circuit round the kingdom once in seven years for the purpose of trying causes They were afterwards directed by magna charta, c 12 to be sent into every county once a-year to take or try certain actions then called recognitions or assises, the most difficult of which they are directed to adjourn into the court of common pleas to be there determined The itinerant justices were sometimes mere justices of assise, or of dower, or of gaol delivery and the like, and they had sometimes a more general commission, to determine all manner of causes justiciarii adomnia placita but the present justices of assise and nisi prius are more immediately derived from the statute West 2 13 Edw I c 30 explained by several other acts, particularly the statute 14 Edw III c 16 and must be two of the king's justices of the one bench or the other, or the chief baron of the exchequer, or the king's serjeants sworn The judges usually make their circuits in their respective vacations after Hilary and Trinity terms, and they now sit by virtue of five several authorities 1 The commission of the peace, in every county of the circuits and all justices of the peace of the county are bound to be present at the assises, and sheriffs are also to give their attendance on the judges, or they shall be fined 2 A commission of oyer and terminer, directed to them and many other gentlemen of the county, by which they are empowered to try treasons, felonies &c and this is the largest commission they have 3 A commission of general gaol delivery, directed to the judges and the clerk of assise associate, which gives them power to try every prisoner in the gaol committed for any offence whatsoever but none but prisoners in the gaol so that one way or other they rid the gaol of all the prisoners in it 4 A commission of assise, directed to the judges and clerk of assise, to take assises, that is, to take the verdict of a peculiar species of jury called an assise, and summoned for the trial of landed disputes The other authority is, 5 That of nisi prius, which is a consequence of the commission of assise, being annexed to the office of those justices by the statute of Westm 2 13 Edw I c 30 And it empowers them to try all questions of fact issuing out of the courts of Westminster, that are then ripe for trial by jury The original of the name is this all causes commenced in the courts of Westminster hall are by the course of the courts appointed to be there tried, on a day fixed in some Easter or Michaelmas term, by a jury returned from the county wherein the cause of action arises, but with this proviso, *nisi prius justiciarii ad assisas capiendas venerint*, unless before the day prefixed the judges of assise come into the county in question This they are sure to do in the vacations preceding each Easter and Michaelmas term, and there dispose of the cause, which saves much expense and trouble, both to the parties, the jury, and the witnesses

The word Assise (from the French *assis*, seated, settled, or established, and formed of the Latin verb *assideo*, I sit by), is used in several different senses It is sometimes taken for the sittings of a court, sometimes for its regulations or ordinances, especially those that fix the standard of weights and measures, and sometimes it signifies a jury, either because juries consisted of a fixed determinate number, or because they continued sitting till they pronounced their verdict

Assise (Black), in history, an assise held at Oxford in July, 1577, so called on account of a sudden ' damp which is said to have arisen, and after nearly smothering the whole court and audience, occasioned the death of the judge, high-sheriff, most of the jury, and above 500 of the spectators This fatality was ascribed by the vulgar to magic, but the discernment of lord Bacon saw through the mist of superstition The symptoms of this disorder, which seems to have been the first appearance of the gaol fever in England, marked the most extreme putridity

To ASSI'ST *v a* (*assister*, Fr *assisto*, Lat) To help (*Romans*)

ASSI'STANCE *s* (*assistance*, Fr) Help, furtherance (*Stillingfleet*)

ASSI'STANT *a* (from *assist*) Helping, lending aid (*Hale*)

Assi'stant *s* (from *assist*) A person engaged in an affair not as principal, but as auxiliary or ministerial (*Bacon*)

ASSI'ZE See Assise

To Assize *v a* (from the noun) To fix the rate of any thing by an assize or writ

ASSI'ZER *s* (from *assize*) An officer that has the care of weights and measures (*Chamb*)

ASSO'CIABLE *a* (*associabilis*, Lat) That may be joined to another

To ASSO'CIATE *v a* (*associer*, French) 1 To unite with another as a confederate (*Shaks*) 2 To adopt as a friend upon equal terms (*Dryden*) 3 To accompany (*Shaks*) 4 To unite, to join (*Boyle*)

Asso'ciate *a* (from the verb) Confederate, joined in interest or purpose (*Milton*)

Asso'ciate *s* (from the verb) 1 A partner (*Sidney*) 2 A confederate (*Hooker*) 3 A companion (*Wotton*)

ASSOCIATION *s* (from *associate*) 1 Union, conjunction, society (*Hooker*) 2 Confederacy (*Hooker*) 3 Partnership (*Boyle*) 4 Connexion (*Watts*) 5 Apposition, union of matter (*Newton*)

Association of ideas, is where two or more ideas constantly and immediately follow or succeed one another in the mind, so that one shall almost infallibly produce the other, whether there be any natural relation between them, or not

Association forms a principal part of Dr Hartley's theory of the mind He distinguishes it into synchronous and successive, and ascribes our simple and complex ideas to the influence of this principle or habit Particular sensations result from previous vibrations conveyed through

the nerves to the medullary substance of the brain; and these are so intimately associated together, that any one of them, when impressed alone, shall be able to excite in the mind the ideas of all the rest. Thus we derive the ideas of natural bodies from the association of their several sensible qualities with the names that express them, and with each other. The sight of part of a large building suggests the idea of the rest instantaneously, by a synchronous association of the parts, and the sound of the words, which begin a familiar sentence, brings to remembrance the remaining parts, in order, by successive association. Dr Hartley maintains, that simple ideas run into complex ones by association, and apprehends, that by pursuing and perfecting this doctrine, we may some time or other be enabled to analyse those complex ideas, that are commonly called the ideas of reflection, or intellectual ideas, into their several component parts, i. e. into the simple ideas of sensation of which they consist, and that this doctrine may be of considerable use in the art of logic, and in explaining the various phænomena of the human mind (*Observations on Man*).

It has been objected against Hartley's theory, that it leads to materialism, and indeed, it must be confessed, that his followers have sometimes, by their warmth, hurried themselves into that cold and comfortless system; but Hartley himself was of opinion these consequences could not be fairly drawn from his theory, he asserted, that he did not presume even to intimate that matter could be endued with the power of sensation, and that the materiality of the soul was no consequence of his doctrine. Whatever opinions, however, may be held as to his philosophy, no doubt can be reasonably entertained of the warmth of his piety, and the steadiness of his faith in the gospel.

ASSO'DES (ασωδης from ασαομαι, *to nauseate*) A continual fever, attended with a loathing of food.

ASSONANCE, in rhetoric and poetry, a term used where the words of a phrase, or a verse, have the same sound or termination, and yet make no proper rhyme.

A'SSONANT *a* Sounding in a manner resembling another sound.

ASSONANT RHYMES is a term particularly applied to a kind of verses common among the Spaniards, where a resemblance of sound serves instead of a natural rhyme. Thus, *ligera, cubierta, tierra, mesa,* may answer each other in a kind of assonant rhyme, because they have each an *e* in the penultimate syllable, and an *a* in the last.

ASSONIA, in botany, a genus of the class and order monadelphia, dodecandria. Calyx double; the outer leafed, lateral bracte-form, fricuspidate; petals, five; stamens twenty, of which five are barren; styles five, capsules five, united, one-celled, two-seeded. The only known species is a native of Bourbon.

To ASSO'RT *v a* (*assortir*, Fr.) To range in classes.

ASSO'RTMENT *s* (from *assort*) 1 The act of classing or ranging. 2 A mass or quantity properly selected and ranged.

To ASSO'T *v a* (from *sot*, *assoter*, Fr) To infatuate: out of use (*Spenser*).

To ASSUA'GE *v a* (ꞅpæꞇ, Saxon) 1 To mitigate, to soften, to allay (*Addison*). 2 To appease, to pacify (*Clarendon*).

To ASSUA'GE *v n* To abate (*Genesis*).

ASSUA'GEMENT *s* (from *assuage*) Mitigation, abatement of evil (*Spenser*).

ASSUA'GER *s* (from *assuage*) One who pacifies or appeases.

ASSUA'SIVE *a* (from *assuage*) Softening, mitigating (*Pope*).

To ASSUB'JUGATE *v a* (*subjugo*, Lat) To subject to: not in use (*Shakspeare*).

ASSUEFA'CTION *s* (*assuefacio* Lat) The state of being accustomed (*Brown*).

ASSU'ETUDE (*assuetudo*, Lat) Accustomance, custom, habit (*Bacon*).

To ASSU'ME *v a* (*assumo*, Lat) 1 To take (*Pope*). 2 To take upon one's self (*Dryden*). 3 To arrogate, to claim or seize unjustly. 4 To suppose something without proof (*Boyle*). 5 To appropriate (*Clarendon*).

ASSU'MER *s* (from *assume*) An arrogant man (*South*).

ASSU'MING *participial a* (from *assume*) Arrogant, haughty (*Dryden*).

ASSUMPSIT, in the law of England, a voluntary or verbal promise, whereby a person assumes, or takes upon him to perform or pay any thing to another. A promise is in the nature of a verbal covenant, and wants nothing but the solemnity of writing and sealing to make it absolutely the same. If therefore it be to do any explicit act, it is an express contract, as much as any covenant, and the breach of it is an equal injury. The remedy indeed is not exactly the same, since instead of an action of covenant, there only lies an action upon the case, for what is called an assumpsit or undertaking of the defendant, the failure of performing which is the wrong or injury done to the plaintiff, the damages whereof a jury are to estimate and settle. As, if a builder promises, undertakes, or assumes to Caius, that he will build and cover his house within a time limited, and fails to do it, Caius has an action on the case against the builder for this breach of his express promise, undertaking or assumpsit, and shall recover a pecuniary satisfaction for the injury sustained by such delay. So also in the case of a debt by simple contract, if the debtor promises to pay it and does not, this breach of promise entitles the creditor to his action on the case, instead of being driven to an action of debt. Thus likewise a promissory note, or note of hand not under seal, to pay money at a day certain, is an express assumpsit, and the payee at common law, or by custom and act of parliament the indorsee, may recover the value of the note in damages, if it remains unpaid. Some agreements indeed, though never so expressly made, are deemed of so important a nature, that they ought not to rest in verbal promise only, which cannot be proved but by the memory (which

sometimes will induce the perjury of witnesses To prevent this, the statute of frauds and perjuries, 29 Car II c 3 enacts, that in the five following cases no verbal promise shall be sufficient to ground an action upon, but at the least some note or memorandum of it shall be made in writing, and signed by the party to be charged therewith 1 Where an executor or administrator promises to answer damages out of his own estate 2 Where a man undertakes to answer for the debt, default, or miscarriage of another 3 Where any agreement is made upon consideration of marriage 4 Where any contract or sale is made of lands, tenements, or hereditaments, or any interest therein 5 and lastly, Where there is any agreement that is not to be performed within a year from the making thereof In all these cases a mere verbal assumpsit is void

There is in law always an implied contract with a common innkeeper, to secure his guest s goods in his inn, with a common carrier or barge-master, to be answerable for the goods he carries, with a common farrier, that he shoes a horse well, without laming him, with a common taylor, or other workman that he performs his business in a workmanlike manner in which, if they fail, an action on the case lies to recover damages for such breach of their general undertaking Also, if an innkeeper or other victualler, hangs out a sign and opens his house for travellers, it is an implied engagement to entertain all persons who travel that way, and upon this universal assumpsit an action on the case will lie against him for damages, if he without good reason refuses to admit a traveller In contracts likewise for sales, if the seller doth upon the sale warrant it to be good, the law annexes a tacit contract to this warranty, that, if it be not so, he shall make compensation to the buyer, else it is an injury to good faith, for which an action on the case will lie to recover damages

ASSUMPTION s (*assumptio*, Lat) 1 The act of taking any thing to one s self (*Hammond*) 2 The supposition of any thing without further proof (*Norris*) 3 The thing supposed, a postulate (*Dryden*) 4 The taking up any person into heaven (*Stillingfleet*),

ASSUMPTION, an episcopal city, and the metropolis of Paraguay, in South America It is situated at the mouth of the river Paraguay Lat 26 0 S Lon 57 40 W

ASSUMPTION, an island near the coast of California Lon 120 W Greenwich Lat 28 4 N

ASSUMPTION, a river of North America, which runs into the river St Lawrence, opposite Montreal, in Canada

ASSUMPTION, a festival in the Romish church in honour of the miraculous ascent of the Virgin Mary into heaven the Greek church, who also observe this festival, celebrate it on the 15th of August with great ceremony

ASSUMPTIVE. *a* (*assumptivus*, Lat) That is assumed

ASSURANCE, in commerce See INSURANCE

There are in London, and in different parts of the kingdom, several companies, each of which has a large capital funded, for the purpose of insuring from loss or damage by fire, buildings, furniture, goods in trade, merchandise, farming stock, ships in port, harbour, or dock, the cargoes of such ships, ships building or repairing, vessels on rivers and canals, the goods on board such vessels, &c These articles are commonly divided into three classes first, *common* assurances, which are effected at 2*s* per cent per annum, secondly, *hazardous* assurances, at 3*s* per cent per annum, and *doubly hazardous*, at 5*s* per cent per annum, The mode of classification may be learnt from the proposals of the most respectable companies; which are, Royal Exchange Assurance Company, incorporated in 1719, Sun Fire Office, incorporated in 1706, London Assurance, incorporated in 1719, Hand in Hand Fire Office, incorporated in 1696, Union Fire Office, incorporated in 1714, Westminster Fire Office, incorporated in 1717, Phœnix Fire Office, established in 1782, British Fire Office, Imperial Insurance Company, 1803, Globe Insurance Office, 1803, Albion, 1805, Hope, 1807, Eagle, 1807 Besides various extensive companies in the country, as in Kent, Norfolk, &c

In 1782 a duty of 1*s* 6*d* was imposed on every 100*l* assured from loss by fire, which was increased in 1797 to 2*s* per cent, and in 1804 to 2*s* 6*d* per cent, the annual duty now payable From the produce of this duty, an estimate has been formed of the total amount of property assured from fire in Great Britain, which appears to have been nearly as follows

In 1785,	- - - -	£125,000,000
1789,	- - - -	142,000,000
1793,	- - - -	167,000,000
1797,	- - - -	184,000,000
1801,	- - - -	223,000,000
1806,	- - - -	260,000,000

We have also *assurances for life*, in virtue whereof, when the person assured dies, a sum of money becomes payable to the person in whose behalf the policy of assurance was granted

ASSURANCES ON LIVES By assuring a life is meant obtaining security for a sum of money to be received should the life drop, in consideration of such a payment made to the assurer, as is a sufficient compensation for the loss and hazard to which he exposes himself. The sum at which this compensation should be valued depends,—1 On the rate of interest at which money is improved And 2. On the probability of the duration of the life to be assured If interest is high, and also the probability high of the duration of the life, the value of the assurance will be proportionably low On the contrary, if the rate of interest is low, and the probability of living also low, the value of the assurance will be proportionably high In order to explain this let 100*l* be supposed to be assured on a life for a year

to come, that is, let 100*l* be supposed payable a year hence, provided a life of a given age fails in that time. Were the interest of money at 5 per cent. and the life sure of failing, the value of the assurance would be the same with the present value of 100*l* payable at the end of the year, reckoning interest at 5 per cent. that is, it would be that sum, which being now put out to interest at 5 per cent. would produce 100*l* at the end of the year, or 95*l* 4*s* 8*d*.

On the contrary, if it be an even chance, or the odds are equal, whether the life does or does not fail in the year, the value of the assurance will be half the former value, or 47*l* 12*s* 4*d*. If the odds against its failing are two to one, that is, if it is to be expected that some one of three lives, at the age of the given life, will fail in the year, the value of the assurance will be a third of the first value, reckoning the same interest, or 31*l* 15*s*. If the odds are 19 to 1, or if it may be expected that some one out of twenty lives, at the age of the given life, will fail in a year, the value of the assurance will be a twentieth part of the first value, or 4*l* 16*s*. If the odds are 49 to 1, or only one out of fifty such lives as the given life can be expected to fail in the year, the value of the assurance will be a fiftieth part of the first value, that is, it will be 1*l* 18*s*. Now the odds of 3 to 1 are, according to Dr. Halley's Table of Observations, the odds that a life aged 87 will not drop in a year. The odds of 19 to 1 are the odds, according to the same table, that a life aged 64 will not drop in a year. And the odds of 49 to 1 are the odds that a life aged 39 will not drop in a year. It follows, therefore, that the value of the assurance of 100*l* for a year, on a life aged 87, is 31*l* 15*s*, on a life aged 64, 4*l* 16*s*, on a life aged 39, 1*l* 18*s*. reckoning interest at 5 per cent. If interest is reckoned at 3 per cent. these values will be 32*l* 7*s*—4*l* 17*s*—1*l* 18*s* 10*d*.

The principles on which the doctrine of life assurances and life annuities depends, are intimately connected with those of the doctrine of chances or probabilities: we shall resume them more at large, and trace their gradual progress, under the article LIFE ANNUITIES.

When a life is assured for any number of years, the premium or value may be paid, either in one single present payment, in consequence of which the sum assured will become payable without any farther compensation, whenever, within the given term, the life shall happen to drop: or the value may be paid in annual payments, to be continued till the failure of the life, should that happen within the term, or, if not, till the determination of the term. And the determination of the value of assurance, in all cases, is to be made out from the rules for computing annuities on lives; the principal writers on which are, Halley, De Moivre, Simpson, Smart, Kersseboom, De Parcieux, Price, Morgan, and Maseres. See also LIFE ANNUITIES, REVERSION, &c.

Assurances may be made either on *single lives*, as above explained, or they may be made on any number of *joint* lives, or on the *longest* of any lives, that is, an assurer may bind himself to pay any sums at the extinction of any *joint* lives, or the *longest* of any lives, or at the extinction of any one or two of any number of lives. There are further assurances on survivorships, by which is meant an obligation, for the value received, to pay a given sum or annuity, provided a given life shall survive any other given life or lives.

The principal offices for making these insurances, in England, are the London and the Royal Exchange Assurance Offices, the Amicable Society incorporated for a perpetual Assurance Office, the Society for equitable Assurances on Lives and Survivorships, and the Westminster Society for granting Annuities and insuring Money on Lives, the Pelican Life Insurance Office, the Globe Insurance Office, the British Assurance Office, the Albion, the Rock, and the Hope. Some of these offices have published extensive tables and proposals, shewing the rates at which their assurances are effected. The rates of the different companies are very nearly alike: as, indeed they must be, if founded on correct principles, and equally advantageous to the public: as a specimen we insert the following.

The person making the assurance is to declare the place and date of birth of the person whose life is to be assured. Whether he have had the small-pox. Whether subject to the gout. And whether in the army or navy.

Conditions of assurance made by persons on their own lives.

The assurance to be void if the person whose life is assured shall depart beyond the limits of Europe, shall die upon the seas (except in his majesty's packets passing between Great Britain and Ireland), or shall enter into or engage in any military or naval service whatever, without the previous consent of the company, or shall die by suicide, duelling, or the hand of justice, or shall not be, at the time the assurance is made, in good health.

Conditions of assurance made by persons on the lives of others.

The assurance to be void if the person whose life is assured shall depart beyond the limits of Europe, shall die upon the seas (except in his majesty's packets passing between Great Britain and Ireland), or shall enter into or engage in any military or naval service whatever, without the previous consent of the company, or shall not be, at the time the assurance is made, in good health.

Any person making an assurance on the life of another must be interested therein, agreeable to act of 14th of Geo. III. chap. 48. which prohibits wagering, or speculative insurances.

TABLE OF PREMIUMS

For assuring the sum of one hundred pounds upon the life of any healthy person, from the age of eight to sixty-seven

Age	One Year			Seven Years at an annual Payment of			For the whole Life at an annual Payment of		
8 to 14	0	17	9	1	1	5	1	17	7
15	0	17	11	1	2	11	1	18	7
16	0	19	2	1	4	7	1	19	8
17	1	1	2	1	6	1	2	0	8
18	1	3	3	1	7	5	2	1	5
19	1	5	0	1	8	6	2	2	8
20	1	7	3	1	9	5	2	3	7
21	1	8	10	1	10	1	2	4	6
22	1	9	3	1	10	6	2	5	4
23	1	9	8	1	11	0	2	6	3
24	1	10	2	1	11	6	2	7	1
25	1	10	7	1	12	1	2	8	1
26	1	11	1	1	12	7	2	9	1
27	1	11	7	1	13	2	2	10	1
28	1	12	1	1	13	9	2	11	1
29	1	12	8	1	14	4	2	12	3
30	1	13	3	1	14	11	2	13	5
31	1	13	9	1	15	7	2	14	7
32	1	14	4	1	16	3	2	15	9
33	1	15	0	1	16	10	2	17	1
34	1	15	8	1	17	8	2	18	3
35	1	16	4	1	18	10	2	19	10
36	1	17	0	1	19	7	3	1	4
37	1	17	9	2	0	8	3	2	10
38	1	18	6	2	1	3	3	4	6
39	1	19	5	2	2	11	3	6	2
40	2	0	8	2	4	1	3	7	11
41	2	2	0	2	5	4	3	9	9
42	2	3	6	2	6	6		11	8
43	2	4	6	2	7	9		13	8
44	2	5	6	2	9	[illegible]	3	15	9
45	2	6	8	2	10	10	3	17	11
46	2	7	10	2	12	6	4	0	2
47	2	9	0	2	14	4	4	2	7
48	2	10		2	16	4	4	5	1
49	2	12		2	18	6	4	7	10
50	2	15	1	3	0	8	4	10	8
51	2	17	4	3	2	8	4	13	6
52	2	19	1	3	4	9	4	16	5
53	3	1	0	3	7	0	4	19	7
54	3	3	0	3	9	5	5	[illegible]	10
55	3	5	0	3	12	0	[illegible]	6	4
56	3	7	3	3	14	8	5	10	1
57	3	9	8	3	17	6		14	0
58	3	12	3	4	0	6	5	18	2
59	3	15	1	4	3	6	6	2	8
60	3	18	1	4	7	1	6	7	4
61	4	1	[illegible]	4	10	11	6	12	4
62	4	3	11	4	15	0	6	17	9
63	4	7	8	4	19	6	7	3	7
64	4	10	9	5	4	10	7	9	10
65	4	15	2	5	10	10	7	16	9
66	5	0	1	5	17	7	8	4	1
67	5	5	6	6	5	[illegible]	8	12	1

A TABLE OF ANNUAL PREMIUMS

Payable during the joint continuance of two lives for assuring one hundred pounds, on the contingency of one life's surviving the other

Ages: Life to be assured	Ages: Life against which the Assurance is to be made	Premium		
10	10	1	8	6
	20	1	9	1
	30	1	8	3
	40	1	7	8
	50	1	6	11
	60	1	6	0
	70	1	4	11
	80	1	3	4
20	10	1	16	6
	20	1	17	0
	30	1	15	9
	40	1	14	8
	50	1	13	6
	60	1	12	1
	70	1	10	6
	80	1	8	4
30	10	2	5	5
	20	2	6	6
	30	2	4	6
	40	2	2	9
	50	2	0	11
	60	1	18	10
	70	1	16	7
	80	1	13	9
40	10	2	19	2
	20	2	19	10
	30	2	18	2
	40	2	15	11
	50	2	12	10
	60	2	9	4
	70	2	5	11
	80	2	1	10
50	10	4	0	11
	20	4	1	10
	30	4	0	1
	40	3	17	10
	50	3	13	10
	60	3	7	7
	70	3	1	6
	80	2	15	0
60	10	5	16	9
	20	5	18	1
	30	5	16	3
	40	5	14	0
	50	5	10	7
	60	5	2	4
	70	4	9	10
	80	3	17	11
67	10	8	1	0
	20	8	2	9
	30	8	0	10
	40	7	18	7
	50	7	15	6
	60	7	8	8
	70	6	10	8
	80	5	8	9

A TABLE OF ANNUAL PREMIUMS

Payable during the continuance of two joint lives for assuring one hundred pounds, to be paid when either of the lives shall drop

Age	Age	l	s	d	Age	Age	l	s	d	Age	Age	l	s	d.	Age	Age	l	s	d	Age	Age	l	s	d
10	10	2	17	1	15	35	4	3	1	20	67	9	13	9	30	60	7	15	0	45	45	6	7	4
	15	3	1	1		40	4	10	4	25	25	4	0	10		67	9	18	1		50	6	17	9
	20	3	5	7		45	4	19	5		30	4	5	0	35	35	4	19	0		55	7	11	0
	25	3	9	3		50	5	11	3		35	4	10	3		40	5	5	6		60	8	9	6
	30	3	13	9		55	6	6	1		40	4	17	4		45	5	13	10		67	10	11	1
	35	3	19	6		60	7	6	0		45	5	6	2		50	6	5	0	50	50	7	7	8
	40	4	6	10		67	9	9	5		50	5	17	10		55	6	19	2		55	8	0	3
	45	4	15	11	20	20	3	13	11		55	6	12	6		60	7	18	6		60	8	18	2
	50	5	7	10		25	3	17	5		60	7	12	5		67	10	1	2		67	10	18	10
	55	6	2	8		30	4	1	9		67	9	15	9	40	40	5	11	9	55	55	8	12	2
	60	7	2	9		35	4	7	3	30	30	4	8	11		45	5	19	9		60	9	9	0
	67	9	6	3		40	4	14	6		35	4	14	1		50	6	10	8		67	11	8	5
15	15	3	5	0		45	5	3	[illegible]		40	5	0	11		55	7	4	5	60	60	10	4	9
	20	3	9	6		50	5	15	4		45	5	9	6		60	8	3	4		67	12	2	1
	25	3	13	1		[illegible]	6	10	2		50	6	1	0		67	10	5	6	67	67	13	15	8
	30	3	17	6		60	7	10	2		55	6	15	5										

Marine Assurance is an indemnity against those perils to which ships and goods are exposed in the course of their voyage from one place to another, whether arising from the dangers of the seas, fire, capture by enemies or pirates, detention by the government of any country, or from any fraudulent act of the master or mariners, such as running away with the ship, carrying her a course different from their orders, sinking her, deserting her, or embezzling the cargo. Assurances of this kind being of peculiar importance to the commercial interests of this country, and many frauds having been committed in this business by persons receiving premiums who were totally unable to fulfil their engagements, an act of parliament was passed in the reign of George I. establishing two corporations with adequate capitals for carrying on this business, and prohibiting any other society or partnership whatsoever from making marine assurances or lending money on bottomry. The two companies are, the Royal Exchange Assurance and the London Assurance, who both engage very extensively in this species of assurance, but as from their superior responsibility they generally require a somewhat higher premium than private underwriters, many persons prefer effecting their assurances with the latter, this business, in London, is carried on chiefly in a set of rooms called Lloyd's coffee house, over the Royal Exchange, where four or five hundred underwriters assemble daily. Persons having an assurance to make generally employ a broker, who having prepared a policy, carries it to an underwriter whom he considers a responsible person, who if he considers the risk offered an eligible one to undertake, signs his name at the bottom of the policy, mentioning the sum he agrees to be answerable for, it is then taken to another, and so on till the whole sum mentioned in the policy is completed. The premium paid depends on the length of the voyage, the condition of the vessel, the season of the year, peace or war, and many other circumstances, of course it is very different at different periods.

ASSURANCE *s* (*assurance*, French.) 1. Certain expectation (*Tillotson*). 2. Secure confidence, trust (*Spenser*). 3. Certain knowledge (*South*). 4. Firmness, undoubting steadiness (*Rogers*). 5. Confidence, want of modesty (*Sidney*). 6. Freedom from vitious shame (*Locke*). 7. Ground of confidence, security (*Dav.*). 8. Spirit, intrepidity (*Dry.*). 9. Sanguinity, readiness to hope (*Hammond*). 10. Testimony of credit (*Tillotson*). 11. Conviction (*Tillotson*). 12. Insurance: see the preceding.

To ASSU'RE. *v. a.* (*assurer*, French). 1. To give confidence by a firm promise (*Maccabees*). 2. To secure another (*Rogers*). 3. To make confident, to exempt from doubt or fear, to confer security (*Milton*). 4. To make secure (*Spenser*). 5. To affiance, to betroth (*Shakspeare*).

ASSU'RED. *participial a.* (from *assure*). 1. Certain, indubitable (*Bacon*). 2. Certain, not doubting (*Shakspeare*). 3. Immodest, viciously confident.

ASSU'REDLY. *ad.* (from *assured*.) Certainly, indubitably (*South*).

ASSU'REDNESS. *s.* (from *assured*.) The state of being assured, certainty.

ASSU'RER. *s.* (from *assure*.) 1. He that gives assurance. 2. He that gives security to make good any loss.

ASSURGENTPETIOLE. In botany, rising up in a curve, declining at the base, but upright at the tip. Arising petiole, rising leaves.

ASSYRIA, a country of Asia, which formerly comprehended those provinces of Turkey and Persia, now called Diarbekr and Erac Arabic. It bordered east on Media, west on Mesopotamia, north on Armenia, and south on Arabia.

Of the government, laws, religion, learning, customs, &c. of the ancient Assyrians nothing absolutely certain is recorded. Their kingdom was at first small, and subsisted for several ages under hereditary chiefs, and their government was very simple. Afterwards, when they rose to the sublimity of empire, their government seems to have been truly despotic, and the empire to have been hereditary. The division of the Assyrian empire into provinces and governments may be ascribed to Ninus, for we find (Diod. Sic. lib. ii.) that this institution was fully established in the reigns of Semiramis and her successors. In this empire the people were distributed into a certain number of tribes (Herod. lib. i. Strabo, lib. xvi.), and their occupations or profession were hereditary. The Assyrians had several distinct councils, and several tribunals for the regulation of public affairs. As to their religion, they were idolaters, and had their idols and temples. In customs, arts, and learning, they differed but little from the Babylonians. They had one very curious practice with regard to marriage: all the girls who were marriageable were assembled in one place, and a public crier put them up to sale one after another. The money which was received for those that were handsome and fetched a high price, was bestowed as a portion upon those whose persons were more plain and homely. When the most beautiful were disposed of, the more ordinary were offered with a certain sum, and allotted to those who were willing to take them with the smallest portion. In this manner all the young women were provided with husbands. If at any time it happened that the parties could not agree, the man was obliged to refund the money which he had received. It was likewise very expressly forbidden to use females ill, or to carry them into any foreign country (Herod. lib. i. Strabo, lib. xvi.). The Assyrians have been competitors with the Egyptians for the honour of having invented alphabetic writing. It appears from the few remains now extant of the writing of these ancient nations, that their letters had a great affinity with each other: they were nearly similar in shape, and both ranged in the same manner from right to left. Playfair's Chronol.

p 67—70 Newton's Chronol ch iii Apud Oper by Horsley, t v p 193—211

ASSYRIANS A native of Assyria

ASSYRII s A name sometimes given to the Syrians and Phœnicians

ASTA, in ancient geography, a town of Liguria, or Piedmont, which was a Roman colony The present name is Asti

ASTABAT a town of Armenia in Asia This is the only place where the ronas, a root which dies a beautiful red, is produced Lat 38 28 N Lon 45 30 E

ASTACUS FLUVIATILIS The officinal crab See CANCER

ASTAROTH, in mythology, an idol of the Philistines, which the Jews destroyed at the command of Samuel It was also the name of a deity of the Sidonians, which was worshipped by Solomon in his idolatrous days See ASTARTE

ASTARTE, in heathen mythology, a Phœnician goddess called the queen of heaven It is said the moon was adored under this name, others suppose her to be the goddess Juno, Cicero calls her the fourth Venus of the Assyrians, and Lucian, Europa, the daughter of Agenor She was sometimes represented holding a long wand with a cross upon the top of it Some medals represent her crowned with battlements and others with a crown of rays Sanchoniathon represents her with a cow's head, and in a medal struck at Cesarea, in Palestine, she is crowned with battlements, with a man's head in her right hand, and a staff in her left This goddess was originally no more than one of the Egyptian symbols, set up and joined with the several signs of the zodiac, to make known the different seasons, and it is plain, that from the different manner in which the Egyptian Isis was represented, a number of different goddesses were formed by other nations, and worshipped under different names

ASTEISM, in rhetoric, a genteel irony or handsome way of deriding another Such e g is that of Virgil Qui Bavium non odit, amet tua carmina, Mævi, &c

ASTELL (Mary), was the daughter of an opulent merchant at Newcastle-upon-Tyne, where she was born about the year 1668 She was educated in a manner suitable to her station, and amongst other accomplishments, was mistress of the French, and had some knowledge of the Latin tongue Her uncle, a clergyman, observing in her some marks of a promising genius, took her under his tuition, and taught her mathematics, logic, and philosophy She left the place of her nativity when she was about twenty years of age, and spent the remaining part of her life at London and at Chelsea Here she pursued her studies with great assiduity, made great proficiency in the abovementioned sciences, and acquired a more complete knowledge of many classic authors Among these Seneca, Epictetus, Hierocles, Antoninus, Tully, Plato, and Xenophon, were her principal favourites

Her life was spent in writing for the advancement of learning religion, and virtue, and in the practice of those religious duties which she so zealously and pathetically recommended to others, and in which perhaps no one was ever more sincere and devout Her sentiments of piety, charity, humility, friendship, and other Christian graces, were uncommonly refined and sublime, and religion sat gracefully upon her, unattended with any forbidding airs of sourness or of gloom Her mind was generally calm and serene, and her conversation was innocently facetious and highly entertaining She would say, "The good Christian only hath reason, and he always ought to be cheerful, and, "That dejected looks and melancholy airs were very unseemly in a Christian" But these subjects she hath treated at large in some of her excellent writings

She was remarkably abstemious, and seemed to enjoy an uninterrupted state of health, till a few years before her death, when, having one of her breasts cut off, it so much impaired her constitution that she did not long survive it This painful operation she underwent without discovering the least timidity, or so much as uttering a groan, and shewed the same resolution and resignation during her whole illness When she was confined to her bed by a gradual decay, and the time of her dissolution drew near she ordered her shroud and coffin to be made, and brought to her bedside, and there to remain in her view, as a constant memento of her approaching fate, and to keep her mind fixed on proper contemplation She died in the year 1731, in the 63d year of her age, and was buried at Chelsea She wrote, 1 A serious Proposal to the Ladies 2 An Essay in Defence of the Female Sex 3 Letters concerning the Love of God 4 Reflections upon Marriage 5 Moderation truly stated 6 The Christian Religion, as professed by a Daughter of the Church of England and some other works

ASTER Star wort, Michaelmas daisy a genus of the class and order syngenesia polygamia superflua Receptacle naked, down simple, florets of the margin more than ten, calyx imbricate, with the lower scales spreading More than a hundred species scattered over the globe They may be subdivided into those,

- A more or less shrubby
- B herbaceous, stem one or two-flowered
- C leaves linear or lanceolate, entire
- D leaves heart-shaped and ovate, serrate
- E leaves ovate, entire
- F leaves lanceolate, the lower more or less serrate
- G leaves pinnate

Of these the only native species of our own country is the a tripolium, found occasionally on our muddy shores

See also BUPHTHALMUM, CARPESIUM, CHRYSANTHEMUM, SENECIO

ASTERABAT, or ASTRABAD, the capital

of a province of the same name in Persia, Asia Lat 36 50 N Lon 55 35 E

ASTE'RIAS Star-fish sea-star A genus of the class vermes, order molusca Body depressed, covered with a coriaceous crust, muricate with tentacula or tentacles, and grooved beneath mouth central, five-rayed Forty-five species dispersed through the different seas of the globe They are all marked with a rough white stony spot above they easily renew parts which have been lost by violence, and fix themselves to the bottom by swimming on the back and bending the rays They may be subdivided according to their forms, into

A Lunate
B Stellate
C Radiate

It is suspected that the mischievous effects which at certain times of the year are produced by eating the common mussel, are occasioned by their having fed upon the a ophiura But the suspicion wants proof

The a caput medusæ is a curious sea-worm The five rays of which it is composed divide into two smaller ones, and each of these into two others, which mode of regular division is continued to a vast extent, gradually decreasing in size, till at length the ramifications amount to many thousands, forming a beautiful net-work Its colour is sometimes pale, or reddish-white, sometimes brown

ASTERIAS, in botany See GENTIANA

ASTERION, in astronomy, one of the Canæs venatici

ASTERISK, a character in form of a small star, set over any word or sentence to make it the more conspicuous, or to refer to the margin, or elsewhere, for a quotation, explanation, or the like The word is a diminutive of αςηρ, a star

ASTERISM, in astronomy, the same with constellation

ASTE'RN ad (from *a* and *stern*) In the hinder part of the ship, behind the ship (*Dryden*)

ASTEROIDS (from αςηρ, *star*, and ειδος, *form*) In astronomy, a name given by Dr Herschel to the new planets, or three small planetary bodies, discovered by the foreign astronomers Piazzi, Olbers, and Harding, which are defined as " celestial bodies either of little or considerable excentricity round the sun, the plane of which may be inclined to the ecliptic in any angle whatever The motion may be direct or retrograde; and they may or may not have considerable atmospheres, very small comas, discs, or nuclei ' To render feasible this notion of Ceres, Pallas, and Juno being bodies very different in their nature from either planets, or comets, and especially from the former, very limited definitions of them are given But all this is, in our opinion, very unnecessary, while it is indicative of a jealousy with regard to fame, unworthy of him who has discovered whole words And after all, the new term is by no means appropriate An asteroid is, from its derivation, "a body resembling fixed stars " but the newly-found heavenly bodies have no one circumstance in common with those luminaries

ASTE'RT v a To terrify, to startle, to fright (*Spenser*)

ASTHE'NIA (*asthenia*, ασθενια, from α priv and σθενος, *strength*) Extreme debility

A'STHMA (*asthma*, ασθμα, from ασθμαζω, *to breathe with difficulty*) Difficult respiration, returning at intervals, with a sense of stricture across the breast and in the lungs, a wheezing, hard cough at first, but more free towards the close of each paroxysm, with a discharge of mucus, followed by a remission It is ranked by Cullen in the class neurosis, and order spasmi There are three species of asthma 1 a spontaneum, when without manifest cause, 2 a plethoricum, when it arises from plethora, 3 a exanthematicum, originating from the repulsion of some humour See MEDICINE

ASTHMA'TICAL ASTHMA'TICK a (from *asthma*) Troubled with an asthma

ASTI, a city of Piedmont, situated near the rivers Barbo and Tanaro, and capital of a country called Astesan, or county of Asti The surrounding country is agreeable and fertile, interspersed with small hills, embellishing the seats of the nobility and gentry Asti was not generally known before the year 1103, when Alaric, king of the Goths, having been defeated by Stilico, the inhabitants of Asti, or the Romans, who held a garrison in that town, conducted thither the infants and wives of that prince, with the most precious of the spoil taken from him It is the see of a bishop, suffragan of the archbishop of Milan, erected in the year 265 Besides the cathedral, it contains upwards of thirty other churches, parochial and conventual Lat 44 50 N Lon 8 2 E

ASTITES, (from *ad*, and *sto*, to stand near) A name of the prostrate glands, so called from their proximity to the bladder

ASTO'NIED *participial a* A word used for *astonished* (*Isaiah*)

To ASTO'NISH v a (*estonner*, Fr) To confound with fear or wonder, to amaze (*Addison*)

ASTO'NISHINGNESS s (from *astonish*) Quality to excite astonishment

ASTO'NISHMENT s (*estonnement*, Fr) Amazement, confusion of mind (*South*)

Astonishment, says Dr Cogan, is the kind and degree of wonder introduced by surprise, which, as it were, overwhelms or petrifies the soul The mental powers are in a stupor, in a state of stagnation High astonishment is the incubus of the mind, which feels nothing at the instant, so much as its inability to act This emotion always relates to things of the highest importance, to things which appear too vast and extensive for the grasp of intellect, rather than to intricacies When it relates to human conduct, astonishment is excited by great undertakings, or extensive projects, by the accomplishment of plans which appeared more than human, whether beneficial or destructive, or to some excess either of virtue or vice The

body marks in a striking manner the singular state of the mind that also becomes immoveable, petrified as it were, or thunderstruck, which is the favorite expression in almost every language The eyes are firmly fixed, without being directed to any particular object, the character of countenance which was formed by the habitual influence of some predominant affection, is for a time effaced, and a suspension of every other impression, a certain vacuity, strongly notes this singular suspension of mind

Wonder and astonishment are expressions which, in many cases, may be used synonymously, as both causes and effects are very analogous for the intricacy attending an important subject, may be connected with its vastness, and sometimes occasioned by it When these are introduced by surprise, that is, when subjects of the kind are suddenly and unexpectedly forced upon the attention, their united effects are extremely powerful, and they give an infinite momentum to their causes, whether they be of a pleasing or displeasing nature

The term amazement, which is sometimes employed, seems to express a medium between wonder and astonishment It is manifestly borrowed from the extensive and complicated intricacies of a labyrinth, in which there are endless mazes, without the discovery of a clue Hence an idea is conveyed of more than simple wonder, the mind is lost in wonder Cogan, p 58

To ASTO'UND, *v a* (*estonner*, Fr) To astonish, to confound with fear and wonder (*Milton*)

ASTRACAN, or ASTRACHAN, an episcopal city of Tartary, in Asia, and capital of a kingdom of the same name, which was conquered by Juan Basilowitz in 1554, and includes the north end part of the west sides of the Caspian Sea From the harbour belonging to this town the Russians embark for Persia The number of its inhabitants is about 70,000, and their principal trade is in salt and fish Lat 46 22 N Lon 47 40 E

ASTRA'DDLE *ad* (from *a* and *straddle*) With one s legs across any thing

ASTRÆA, in astronomy, one of the names of Virgo

ASTRÆA, in mythology, the goddess of Justice, the daughter of Jupiter and Themis, and came down from heaven in the golden age, but when the manners of men became corrupt, she left the earth and returned to heaven

ASTRAGAL, in architecture, from the Greek ἀστράγαλος, *the bone of the heel*, is a little round member, in form of a ring, or bracelet, serving as an ornament at the tops and bottoms of columns The astragal is often cut into beads and berries

ASTRAGAL, in gunnery, a round moulding encompassing a cannon, about half a foot from its mouth

ASTRAGALUS, (*astragalus*, ἀστράγαλος, *a cockal, or die*, because it is shaped like the die used in ancient games) In anatomy, a bone of the tarsus, upon which the tibia moves, It is placed posteriorly and superiorly in the tarsus, and is formed of two parts, one large, which is called its body the other small, like a process The part where these two unite is termed the neck

ASTRAGALUS In botany, liquorice vetch, milk vetch a genus of the class and order diadelphia decandria Legume mostly two celled, gibbous, seeds disposed in two rows A hundred and seventy three species, which may be subdivided into those,

- A with leafy stems, erect, flower axillary
- B spikes cylindric axillary, sessile or nearly so
- C stems leafy, erect, spikes and racemes peduncled
- D stems leafy, diffuse
- E leaflets, placed in whorls
- F scape naked with a leafy stem
- G shrubs or undershrubs with the petioles permanent and becoming spinous

Three only are natives of our own country — A glycyphyllus wild liquorice, found in our woods —A hypoglottis, in our heaths —A uralensis in the mountains of Scotland The last is recommended by some agriculturists as a good fodder for cattle

The two following are medical plants a exscapus Stemless milk vetch The root of this plant astragalus exscapus, acaulis exscapus leguminibus lunatis, foliis villosis of Linneus is said to cure confirmed syphilis, especially when in the form of nodes and nocturnal pains A tragacantha The plant which affords the gum tragacanth See TRAGACANTHA

A'STRAL *a* (from *astrum*, Lat) Starry, relating to the stars (*Dryden*)

ASTRANTIA Black masterwort a genus of the class and order pentandria, digynia Partial involucres lanceolate, spreading, equal, longer than the umbellet, coloured, florets of the ray abortive Five species, chiefly natives of the Alps

ASTRARIUS HÆRES, in law, is where an ancestor, by conveyance, has settled his heir apparent and family in a house in his lifetime

ASTRA'Y, *ad* (from *a* and *stray*) Out of the right way (*Milton*)

To ASTRI'CT *v a* (*astringo*, Latin) To contract by applications (*Arbuthnot*)

ASTRI'CTION *s* (*astrictio*, Latin) The act or power of contracting the parts of the body by applications (*Bacon*)

ASTRI'CTIVE *a* (from *astrict*) Styptick, of a binding quality

ASTRI'CTORY *a* (*astrictorius*, Latin) Astringent, apt to bind

ASTRI'DE *ad* (from *a* and *stride*) With the legs open (*Boyle*)

ASTRI'FEROUS *a* (*astrifer*, Lat.) Bearing, or having stars

To ASTRI'NGE *v a* (*astringo*, Lat) To press by contraction, to make the parts draw together (*Bacon*)

ASTRI'NGENCY *s* (from *astringe*) The

power of contracting the parts of the body opposed to the power of *relaxation* (*Bacon*)

ASTRI'NGENT *a* (*astringens*, Lat) Binding; contracting (*Bacon*)

ASTRINGENT PRINCIPLE, in chemistry, a name given to the substance which exists chiefly in nutgalls, the bark of some trees, and in various plants, and the distinguishing property of which is astringency, or the power of contracting and hardening animal fibre, whether living or dead Its effects are strikingly observable in the process of tanning The property of forming a black precipitate with solutions of iron has been usually, though erroneously, given as one of the surest tests of astringency, but this belongs to the gallic acid, with which the astringent principle happens, in this and many other cases, to be united The proper tests for this substance are, that it corrugates the tongue when tasted, giving a sensation of harshness and roughness to the palate, and its contracting effects upon any kind of animal jelly The present name of this substance is TANNEN, under which term its properties will be more fully detailed

ASTRINGENT SAFFRON OF MARS, or RED OXYD OF IRON, a reddish brown powder, not liable to be attracted by the loadstone, is formed by exposing filings of steel, or scales of iron, under a muffle

ASTRI'NGENTS In medicine See ADSTRINGENTS

ASTROGNOSIA *s* The art of knowing the stars

ASTRO'GRAPHY *s* (from ἀστὴρ and γράφω) The science of describing the stars

ASTROITES See HELMINTHOLITHUS

A'STROLABE *s* (of ἀστὴρ, and λαβεῖν, *to take*) The name for a stereographic projection of the sphere, either upon the plane of the equator the eye being supposed to be in the pole of the world, or upon the plane of the meridian when the eye is supposed in the point of the *intersection of the equinoctial* and horizon

A'STROLABE is also the name of an instrument formerly used for taking the altitude of the sun or stars at sea

A'STROLABE, among the ancients, was nearly the same as our armillary sphere

ASTRO'LOGER *s* (*astrologus*, Lat) One that, supposing the influence of the stars to have a casual power, professes to foretel or discover events by those influences (*Swift*)

ASTROLO'GIAN *s* (from *astrology*) An astrologer (*Hudibras*)

ASTROLO'GICAL ASTROLO'GICK *a* (from *astrology*) 1 Professing astrology (*Wotton*) 2 Relating to astrology (*Bentley*)

ASTROLO'GICALLY. *ad* (from *astrology*) In an astrological manner.

To ASTROLO'GIZE *v n* (from *astrology*) To practise astrology

ASTRO'LOGY, *the art of foretelling future events from the positions, aspects, and influences of the heavenly bodies.* The word is compounded of ἀστὴρ, *star*, and λόγος, *discourse*, whence, in the literal sense of the term, astrology should signify no more than the doctrine or science of the stars This indeed was its original acceptation, and constituted the ancient astrology, which consisted formerly of both the branches now called astronomy and astrology, under the name of the latter only, and for the sake of making judiciary predictions it was, that astronomical observations, properly so called, were chiefly made by the ancients And though the two branches are now perfectly separated, and that of astrology almost universally rejected by men of real learning, this has but lately been the case, as their union subsisted, in some degree, from Ptolemy till Kepler, who had a strong bias towards the ancient astrology

Astrology may be divided into two branches, natural and judiciary To the former belongs the predicting of natural effects, such as the changes of weather, hurricanes, floods, earthquakes, &c But this art properly belongs to physiology, or natural philosophy and is only to be deduced, a posteriori from phenomena and observations Judiciary or judicial astrology, which is what is commonly and properly called astrology, is that which professes to foretel moral events, or such as have a dependence on the free will and agency of man, as if they were produced or directed by the stars This species of imposture, it is commonly said, was invented in Chaldea and from thence transmitted to the Egyptians, Greeks, and Romans, though some insist that it was of Egyptian origin, and ascribe the invention to Cham But it is to the Arabs that we owe it

ASTRO'METER, the name given to a simple mechanical contrivance by means of which the rising and setting of the sun stars, and planets, their positions in the heavens, &c may be approximately ascertained A new instrument of this kind has been lately devised by Dr David Brewster, for a description of which the reader to whom such a contrivance may be interesting, may consult the Philosophical Journal, No 70, or the Retrospect of Philosophical, &c Discoveries, No 10

ASTRO'NIUM In botany, a genus of the class and order dioecia pentandria Calyx five-leaved, five petals Male nectary five glands in the disk Fem styles three, seed one, lactescent. The only known species is a native tree of New Spain, secreting a gummy terebinthine juice, and ornamented with small red flowers

ASTRO'NOMER *s* (from ἀστὴρ and νόμος) One that studies the celestial motions, and the rules by which they are governed (*Locke*)

ASTRONO'MICAL ASTRONO'MICK *a* (from *astronomy*) Belonging to astronomy (*Brown*)

ASTRONOMICAL OBSERVATIONS Of these there are records, or mention, in almost all ages It is said that the Chinese have observations for a course of some thousand years But of these, as well as those of the Indians, we have never yet had any benefit But the

observations of most of the other ancients, as Babylonians, Greeks, &c amongst which those of Hipparchus make a principal figure, are carefully preserved by Ptolemy, in his Almagest Our two countrymen Jer Horrox and Will Crabtree, are celebrated for their observations from the year 1635 to 1645, who first observed the transit of Venus over the Sun in the year 1639 —They were followed by Flamsteed, Cassini the father and son, Halley, de la Hire, Roemer, and Kirchius — The observations of the celebrated Dr Bradley have not yet been published, though long expected We have now published, from time to time, the accurate observations of the present British astronomer royal as also those of the French and other observatories, with the observations of many ingenious private astronomers, which are to be found in the Transactions and Memoirs of the various Philosophical Societies — There have been also observations of many other eminent astronomers, as Galileo, Huygens, and our countryman Harriot, whose very interesting observations have lately been brought to light by the earl of Egremont and count Bruhl, by whose means they may come to be published Other publications of celestial observations are those of Cassini, La Caille, Monnier, &c

The late veteran astronomer M Jerome Lalande, in his History of Astronomy for the year 1801, has the following remarks on the subject of this article ' The observations of Tycho, Flamsteed, Picard, La Caille, and Maskelyne have been the foundation on which the whole progress in the science of astronomy has been built theories the most profound, calculations the most learned, will not surpass them, either in importance or duration The observations alone will survive us, and observers, whom some would frequently attempt to deride, may console themselves, they will be the only astronomers to whom, long after their decease, hymns of praise and gratitude will be offered by our successors, and by posterity

ASTRONO'MICALLY *ad* (from *astronomical*) *In an astronomical manner*

ASTRO'NOMY *s* (ἀςρονομία) A mixed mathematical science, teaching the knowledge of the celestial bodies, their magnitudes, motions, distances, periods, eclipses and order The determination of the magnitudes, distances, &c of the heavenly bodies, and the orbits which such of them as are moveable describe is called pure or plain ASTRONOMY, and the investigations of the causes of their motions, and the laws by which they are regulated, is called physical ASTRONOMY

History of Astronomy

The origin of the science of Astronomy has been ascribed to different persons, nations, and ages but on this head nothing can be accurately determined Indeed, it is probable that mankind never existed without some knowledge of astronomy amongst them For, besides the motives of mere curiosity, which are sufficient of themselves to have excited men to a contemplation of the glorious and varying celestial canopy, it is obvious that some parts of the science answer such essential purposes to mankind, as to make the cultivation of it a matter of indispensable necessity Accordingly we find traces of it, in different degrees of improvement, among all nations

Josephus ascribes to Seth and his posterity a considerable knowledge of astronomy he speaks of two pillars the one of stone and the other of brick, called the pillars of Seth, upon which they engraved the principles of the science, and he says that the former was still entire in his time. But be this as it may, it is evident that the great length of the antediluvian lives would afford such excellent opportunities for observing the heavenly bodies, that we cannot but suppose that the science of astronomy was considerably advanced before the flood Indeed Josephus says, that longevity was bestowed upon them for the very purpose of cultivating the sciences of geometry and astronomy, observing that the latter could not be learned in less than 600 years, ' for that period,' he adds, " is the grand year ' An expression remarkable enough, and by which it may be supposed is meant the period in which the sun and moon come again into the same situation in which they were at the beginning of it, with regard to the nodes, apogee of the moon, &c " This period, says Cassini, " of which we find no intimation in any monument of any other nation, is the finest period that ever was invented, for it brings out the solar year more exactly than that of Hipparchus and Ptolemy, and the lunar month within about one second of what is determined by modern astronomers " If the Antediluvians had such a period of 600 years, they must have known the motions of the sun and moon more exactly than their descendants seem to have known them some ages after the flood

Josephus also relates that " Abraham read lectures in astronomy and arithmetic to the Egyptians, which they understood nothing of till Abraham brought them from Chaldea to Egypt, and from thence they passed to the Greeks ' And Berosus observes, that " Abraham was a great and just man, and famous for his celestial observations

M Bailly in his elaborate history of ancient and modern astronomy, endeavours to trace the origin of this science among the Chaldeans Egyptians, Persians, Indians and Chinese, to a very early period And thence he maintains, that it was cultivated in Egypt and Chaldea 2800 years before Christ, in Persia, 3209, in India, 3101, and in China 2952 years before that era He also apprehends that astronomy had been studied even long before this distant period, and that we are only to date its revival from thence

In investigating the antiquity and progress of astronomy among the Indians, M Bailly examines and compares four different sets of astronomical tables of the Indian philosophers, namely, that of the Siamese, explained by M Cassini in 1689; that brought from India by M le Gentil of the Academy of Sciences, and two other manuscript tables, found among the papers of the late M de Isle all of which he found to accord together, and all referring to the meridian of Benares, abovementioned It appears that the fundamental epoch of the Indian astronomy is a conjunction of the sun and moon, which took place at the amazing distance of 3102 years before Christ and M Bailly informs us that, by our most accurate astronomical tables, such a conjunction did really happen at that time He farther observes that, at present, the Indians calculate eclipses by the mean motions of the sun and moon commencing at a period 5000 years distant. The cycle of 19 years

is also used by the Indians, and their astronomy agrees with modern discoveries as to the obliquity of the ecliptic, an acceleration of the motion of the equinoctial points, and many other respects From the researches made into the knowledge of the Indians on these points, by Playfair, in the second volume of the Edinburgh Transactions, and several writers in the Asiatic Researches, it may be inferred that the fabulous accounts of the antiquity of the world, believed by the vulgar among the Hindoos, refer only to various periods assigned by their astronomers for the commencement of different calculations.

The solar year of the Brahmins of Tervalore is divided into 12 unequal months, each being equal to the time the sun occupies in moving through a sign; and in their calculations for a day, they employ the time the sun moves 1° in the ecliptic Their sidereal year consists of $365^d\ 6^h\ 12^m\ 30^s$ and the tropical of $365^d\ 5^h\ 50^m\ 35^s$ They assign inequalities to the motions of the planets, answering very well to the annual parallax, and the equation of the centre

Most authors, however, fix the origin of astronomy and astrology, either in Chaldea or in Egypt; and accordingly among the ancients we find the word Chaldean often used for astronomer, or astrologer Indeed both of these nations pretended to a very high antiquity, and claimed the honour of producing the first cultivators of this science The Chaldeans boasted of their temple or tower of Belus, and of Zoroaster, whom they placed 5000 years before the destruction of Troy, while the Egyptians boasted of their colleges of priests, where astronomy was taught, and of the monument of Osymandyas, in which, it is said, there was a golden circle of 365 cubits in circumference, and one cubit thick, divided into 365 equal parts according to the days of the year, &c.

Diodorus Siculus informs us that "the southern parts of Arabia are made up of sandy plains of a prodigious extent, the travellers through which direct their course by the bears in the same manner as is done at sea" It appears, therefore, that the inhabitants were acquainted with some of the constellations He farther observes that the Chaldeans made the annual motion of the sun oblique to the equator, and contrary to the daily motion The Chaldeans made 36 constellations, twelve in the zodiac, and 24 out of it They also made an observation on Saturn in the year 228 A C which is preserved by Ptolemy, and it appears to be the only one which they made on the planets Mr E Barnard says (Phil Trans. No. 158) that the Egyptians discovered very early, that the stars had an annual motion of 50″ 9‴ 45⁗ in a year. And, according to Macrobius, the Egyptians made the planets revolve about the sun in the same order as we do but it does not appear at what time the planets were discovered

From Chaldea and Egypt the science of astronomy passed into Phenicia, which this people applied to the purposes of navigation, steering their course by the north polar star, and hence they became masters of the sea, and of almost all the commerce in the world.

The Greeks, it is probable, derived their astronomical knowledge chiefly from the Egyptians and Phenicians, by means of several of their countrymen who visited these nations, for the purpose of learning the different sciences. Newton supposes that most of the constellations were invented about the time of the Argonautic expedition; but it is more probable that they were, at least most part of them, of a much older date, and derived from other nations, though clothed in fables of their own invention or application Several of the constellations are mentioned by Hesiod and Homer, the two most ancient writers among the Greeks, and who lived about 870 years before Christ Their knowledge in this science however was greatly improved by Thales the Milesian, and other Greeks, who travelled into Egypt, and brought from thence the chief principles of the science Thales was born about 640 years before Christ, and he, first of all among the Greeks, observed the stars, the solstices, the eclipses of the sun and moon, and predicted the same And the same was further cultivated and extended by his successors Anaximander, Anaximenes, and Anaxagoras, but most especially by Pythagoras, who was born 577 years before Christ, and having resided for several years in Egypt, &c brought from thence the learning of these people, taught the same in Greece and Italy, and founded the sect of the Pythagoreans He taught that the sun was in the centre of the universe, that the earth was round, and people had antipodes, that the moon reflected the rays of the sun and was inhabited like the earth, that comets were a kind of wandering stars, disappearing in the further parts of their orbits, that the white colour of the milky way was owing to the united brightness of a great multitude of small stars, and he supposed that the distances of the moon and planets from the earth were in certain harmonic proportions to one another

Philolaus, a Pythagorean, who flourished about 450 years before Christ, asserted the annual motion of the earth about the sun, and not long after, the diurnal motion of the earth on her own axis was taught by Hicetas, a Syracusan About the same time flourished at Athens, Meton and Euctemon where they observed the summer solstice 432 years before Christ, and observed the risings and settings of the stars, and what seasons they answered to Meton also invented the cycle of 19 years, which still bears his name

Eratosthenes, who was born at Cyrene in the year 271 before Christ, measured the circumference of the earth by means of a gnomon, and being invited to Alexandria, from Athens, by Ptolemy Euergetes, and made keeper of the royal library there, he set up for that prince those armillary spheres, which Hipparchus and Ptolemy the astronomer afterwards employed so successfully in observing the heavens He also determined the distance between the tropics to be $\frac{1}{8}\frac{1}{4}$ of the whole meridian circle, which makes the obliquity of the ecliptic in his time to be 23° 51 ½ The celebrated Archimedes, too, cultivated astronomy as well as geometry and mechanics, he determined the distances of the planets from one another, and constructed a kind of planetarium or orrery, to represent the phenomena and motions of the heavenly bodies

To pass by several others of the ancients, who practised or cultivated astronomy, more or less, we find that Hipparchus, who flourished about 140 years before Christ, was the first who applied himself to the study of every part of astronomy, and, as we are informed by Ptolemy, made great improvements in it he discovered that the orbits of the planets are eccentric, that the moon moved slower in the apogee than in her perigee, and that there was a motion of anticipation of the moon's nodes he constructed tables of the motions of the sun and moon, collected accounts of such eclipses,

&c as had been made by the Egyptians and Chaldeans, and calculated all that were to happen for 600 years to come he discovered that the fixed stars changed their places, having a slow motion of their own from west to east: he corrected the Calippic period, and pointed out some errors in the method of Eratosthenes for measuring the circumference of the earth he computed the sun's distance more accurately than any of his predecessors but his chief work is a catalogue which he made of the fixed stars, to the number of 1022, with their longitudes, latitudes, and apparent magnitudes, which, with most of his other observations, are preserved by Ptolemy in his Almagest

There was but little progress made in astronomy from the time of Hipparchus to that of Ptolemy, who was born at Pelusium in Egypt in the first century of christianity, and who made the greatest part of his observations at the celebrated school of Alexandria in that country Profiting by those of Hipparchus, and other ancient astronomers, he formed a system of his own, which, though erroneous, was followed for many ages by all nations He compiled a great work, called the Almagest, which contained the observations and collections of Hipparchus and others his predecessors in astronomy, on which account it will ever be valuable to the professors of that science This work was preserved from the grievous conflagration of the Alexandrine library by the Saracens, and translated out of Greek into Arabic in the year 827, and from thence into Latin in 1230

During the long period from the year 800 till the beginning of the 14th century, the western parts of Europe were immersed in gross ignorance and barbarity, while the Arabians, profiting by the books they had preserved from the wreck of the Alexandrine library cultivated and improved all the sciences, and particularly that of astronomy, in which they had many able professors and authors The caliph Al Mansur first introduced a taste for the sciences into his empire His grandson Al Mamun, who ascended the throne in 814, was a great encourager and improver of the sciences, and especially of astronomy Having constructed proper instruments, he made many observations, determined the obliquity of the ecliptic to be 23° 35, and under his auspices a degree of the circle of the earth was measured a second time in the plain of Singar, on the border of the Red Sea About the same time Alferganus wrote elements of astronomy, and the science was from hence greatly cultivated by the Arabians, but principally by Albategnius, who flourished about the year 880, and who greatly reformed astronomy, by comparing his own observations with those of Ptolemy hence he computed the motion of the sun's apogee from Ptolemy's time to his own, settled the precession of the equinoxes at one degree in 70 years, and fixed the obliquity of the ecliptic at 23° 35 The tables which he composed, for the meridian of Aracta were long esteemed by the Arabians After his time, though the Saracens had many eminent astronomers, several centuries elapsed without producing any very valuable observations, excepting those of some eclipses observed by Ebn Younis, astronomer to the caliph of Egypt, by means of which the quantity of the moon's acceleration since that time may be determined

Other eminent Arabic astronomers were, Arzachel a Moor of Spain, who observed the obliquity of the ecliptic he also improved Trigonometry by constructing tables of sines, instead of chords of arches, dividing the diameter into 300 equal parts And Alhazen, his contemporary, who wrote upon the twilight, the height of the clouds, the phenomenon of the horizontal moon, and who first shewed the importance of the theory of refractions in astronomy

The settlement of the Moors in Spain introduced the sciences into Europe, from which time they have continued to improve, and to be communicated from one people to another, to the present time when astronomy and all the sciences have arrived at a very eminent degree of perfection The emperor Frederick II, about 1230, first began to encourage learning restoring some decayed universities, and founding a new one in Vienna he also caused the works of Aristotle, and Ptolemy's Almagest, to be translated into Latin, and from the translation of this work we may date the revival of astronomy in Europe, Two years after this, John de Sacro Bosco, that is, of Halifax, compiled, from Ptolemy, Albategnius, Alferganus, and other Arabic astronomers, his work De Sphæra, which was held in the greatest estimation for 300 years after, and was honoured with commentaries by Clavius and other learned men In 1240, Alphonso, king of Castile, not only cultivated astronomy himself, but greatly encouraged others, and by the assistance of several learned men he corrected the tables of Ptolemy and composed those which were denominated from him the Alphonsine Table About the same time also Roger Bacon, an English monk, wrote several tracts relative to astronomy, particularly of the lunar aspects, the solar rays, and the places of the fixed stars And, about the year 1270, Vitello, a Polander, composed a treatise on optics in which he shewed the use of refractions in astronomy

Little other improvement was made in astronomy till the time of Purbach, who was born in 1423 He composed new tables of sines for every 10 minutes, making the radius 60, with four ciphers annexed He constructed spheres and globes, and wrote several astronomical tracts as, a commentary on Ptolemy's Almagest, some treatises on arithmetic and dialling, with tables for various climates, new tables of the fixed stars reduced to the middle of that century, and he corrected the tables of the planets, making new equations to them where the Alphonsine tables were erroneous. In his solar tables, he placed the sun's apogee in the beginning of Cancer, but retained the obliquity of the ecliptic 23° 33½′, as determined by the latest observations He also observed some eclipses, made new tables for computing them, and had just finished a theory of the planets, when he died in 1462, being only 39 years of age

After Purbach the subject of astronomy was much cultivated by John Muller, commonly called Regiomontanus his labours were succeeded by those of Bernard Walther, and Walther was followed by John Werner, a clergyman, at Nuremberg, &c —he shewed that the motion of the fixed stars, since called the precession of the equinoxes, was about 1° 10 in 100 years

But Nicolaus Copernicus was the next who made any considerable figure in astronomy. About the year 1507 he conceived doubts of the Ptolemaic system, and entertained notions about the true one, which he gradually improved by a series of astronomical observations, and the contemplation of former authors. By these he formed

new tables, and completed his work in the year 1530, containing these, and a renovation of the true system of the universe, in which all the planets are considered as revolving about the sun, placed in the centre. See COPERNICUS.

After the death of Copernicus, the science and practice of astronomy were greatly improved by Schoner, Nonius, Appian, Gemma Frisius, Byrgius, &c.

About the year 1561, William IV. landgrave of Hesse Cassel, applied himself to the study of astronomy, and with the best instruments which could then be procured made a great number of observations, published by Snelius in 1618, and preferred by Hevelius to those of Tycho Brahe. From these observations he formed a catalogue of 400 stars, with their latitudes and longitudes, adapted to the beginning of the year 1593.

Tycho Brahe, a noble Dane, began his observations about the same time with the landgrave of Hesse, and observed the great conjunction of Jupiter and Saturn; but finding the usual instruments very inaccurate, he constructed many others much larger and exacter. In 1571 he discovered a new star in the chair of Cassiopeia, which induced him, like Hipparchus on a similar occasion, to make a new catalogue of the stars, which he composed to the number of 777, and adapted their places to the year 1600. In the year 1576, by favour of the king of Denmark, he built his new observatory, called Uramburg, on the small island Huenna, opposite to Copenhagen, which he very amply furnished with many large instruments, some of them so divided as to show single minutes, and in others the arch might be read off to 10 seconds. Tycho invented a system to account for the planets motions. See TYCHONIC. But he is more to be noted on account of his accurate observations, which tended much to the discovery of the real nature of the planetary orbits.

While Tycho resided at Prague with the emperor, he prevailed on Kepler to leave the university of Glatz, and to come to him; and Tycho dying in 1601, Kepler enjoyed all his life the title of mathematician to the emperor, who ordered him to finish the tables of Tycho Brahe, which he published in 1627, under the title of Rodolphine. He died about the year 1630, at Ratisbon, where he was soliciting the arrears of his pension. From his own observations and those of Tycho, Kepler discovered several of the true laws of nature, by which the motions of the celestial bodies are regulated. He discovered that all the planets revolve about the sun, not in circular, but in elliptical orbits, having the sun in one of the foci of the ellipse; that their motions are not equable, but varying quicker or slower, as they are near to the sun or farther from him; that the areas described by the variable line drawn from the planet to the sun are equal in equal times, and always proportional to the times of describing them. He also discovered, by trials, that the cubes of the distances of the planets from the sun were in the same proportion as the squares of their periodical times of revolution. By observations also on comets, he concluded that they are freely carried about among the orbits of the planets, in paths that are nearly rectilinear, but which he could not then determine. See Dr. Sm[illegible] the Discoveries of Kepler.

Some much was done by Wright, [illegible]yer, &c. To Napier we owe some [illegible]orems and improvements in spherics, besides the ever memorable invention of logarithms. Bayer, a German, published his Uranometria, or the figures of all the constellations visible in Europe, with the stars marked on them, and accompanied by names or the letters of the Greek alphabet; a contrivance by which they may easily be referred to with distinctness and precision. About the same time too, astronomy was cultivated abroad by Mercator, Maurolycus, Maginus, Homelius, Schulter, Stevin, Galileo, &c. and in England by Thomas and Leonard Digges, John Dee, Robert Flood, Harriot, &c.

The beginning of the 17th century was particularly distinguished by the invention of telescopes, and the application of them to astronomical observations. The more distinguished early observations with the telescope were made by Galileo, Harriot, Huygens, Hook, Cassini, &c. It is said that, from report only, Galileo made for himself telescopes, by which were discovered inequalities in the moon's surface, Jupiter's satellites, and the ring of Saturn; also spots on the sun by which he found out the revolution of that luminary on its axis; and he discovered what was merely supposed by Pythagorus, that the nebulæ and milky-way were full of small stars. Harriot also, hitherto known only as an algebraist, made much the same discoveries as Galileo, and as early, if not more so, as appears by his papers not yet printed, in the possession of the earl of Egremont.

Hevelius, from his own curious observations furnished a catalogue of fixed stars, much more complete than Tycho's. Huygens and Cassini discovered the satellites of Saturn and his ring. And Gassendus, Horrox, Bullialdus, Ward, Riccioius, Gascoign, &c. each contributed very considerably to the improvement of astronomy.

The immortal Newton first demonstrated, from physical considerations, the great law that regulates all the heavenly motions, sets bounds to the planets orbs, and determines their greatest excursions from the sun, and their nearest approaches to it. It was he who first taught the world whence arose that constant and regular proportion observed by both primary and secondary planets, in their circulation round their central bodies, and their distances compared with their periods. He has also given us a new theory of the moon, which accurately answers all her inequalities, and accounts for them from the laws of gravity and mechanism.

Mr Flamsteed was appointed the first astronomer royal at Greenwich in 1675. He observed for 44 years all the celestial phenomena, the sun, moon, planets, and fixed stars, of all which he gave an improved theory and tables, viz. a catalogue of 3000 stars with their places, to the year 1689; also new solar tables, and a theory of the moon according to Horrox; likewise, in sir Jonas Moore's System of Mathematics, he gave a curious tract on the doctrine of the sphere, shewing how, geometrically, to construct eclipses of the sun and moon, as well as occultations of the fixed stars by the moon. And it was upon his tables that were constructed both Halley's tables, and Newton's theory of the moon.—Cassini also, the first French astronomer royal, very much distinguished himself, making many observations on the sun, moon, planets and comets, and greatly improved the elements of their motions. He also erected the gnomon, and drew the celebrated meridian line in the church of Petronia at Bologna.

In 1719, Flamsteed was succeeded by Dr Halley, who obliged the world with the astronomy of comets, and with a catalogue of the stars in the southern hemisphere, and was a very great benefactor to astronomy by his observations to which may be added that he printed a new set of astronomical tables, more accurate than any before published He recommended the method of determining the longitude by the moon s distances from the sun and certain fixed stars, a method which had before been noticed and which has since been carried into execution

About this time a dispute arose concerning the figure of the earth Newton had determined from a consideration of the laws of gravity, and the diurnal motion of the earth that the figure of it was an oblate spheroid, and flattened at the poles but Cassini, from the measures of Picart, supposed it to be an oblong spheroid or lengthened at the poles To settle this dispute, it was resolved, under Lewis XV to measure two degrees of the meridian, one near the equator, and the other as near the pole as possible For this purpose, the Royal Academy of Sciences sent to Lapland, Maupertuis Clairault, Camus, and Le Monier, who were accompanied by Outhier, and Celsus, professor of anatomy at Upsal On the southern expedition were sent Godin, Condamine and Bouguer, to whom the king of Spain joined George Juan and Antonio de Ulloa These set out in 1735, and returned at different times in 1744, 1745 and 1746, but the former party, who set out only in 1736, returned the year following, having both fulfilled their commissions Picart s measure was revised by Cassini and De la Caille which after his errors were corrected, was found to agree very well with the other two and the result of the whole served to confirm the determination of the figure before laid down by Newton On the southern expedition, the attraction of the great mountains of Peru was found to have a sensible effect on the plumb line of one of their largest instruments, deflecting it seven or eight seconds from the true perpendicular See DEGREE and EARTH

On the death of Halley, in 1742, he was succeeded by Bradley, as astronomer royal at Greenwich The accuracy of his observations enabled him to detect the smaller inequalities in the motions of the planets and fixed stars The consequence of this accuracy was, the discovery of the aberration of light the nutation of the earth s axis, and a much greater degree of perfection in the lunar tables

Bradley was succeeded in 1762, in his office of astronomer royal, by Bliss, Savilian professor of astronomy who being in a declining state of health, did not long enjoy it In 1765, he was succeeded by Nevil Maskelyne, the present excellent astronomer royal, who, in January 1761, was sent by the Royal Society, at a very early age to the island of St Helena, to observe the transit of Venus over the sun, and the parallax of the star Sirius The first of these objects partly failed, by clouds preventing the sight of the second internal contact, and the second also, owing to Short having suspended the plumb line by a loop from the neck of the central pin However our astronomer indemnified himself by many other valuable observations thus, he observed at St Helena, the tides, the horary parallaxes of the moon, and the going of a clock, to find, by comparison with its previous going which had been observed in England, the difference of gravity at the two places also in going out and returning, he practised the method of finding the longitude by the lunar distances taken with Hadley s quadrant making out rules for the use of seamen, and teaching the method to the officers on board the ship, which was explained in the Philosophical Transactions for the year 1762, and more fully afterwards in the British Mariner s Guide published in the year 1763 In September 1763, he sailed for the island of Barbadoes, to settle the longitude of the place, to examine Harrison s watch, and to try Irwin s marine chair While at Barbadoes, he made many other observations, and amongst them, many relating to the moon s horary parallaxes not yet published Returning to England in the latter part of the year 1764, he was appointed in 1765 to succeed Bliss, and immediately recommended to the Board of Longitude the lunar method of finding the longitude, and proposed to it the project of a nautical almanac, to be calculated and published to facilitate that method this it agreed to, and the first volume was published for 1767 and has continued ever since under his direction, to the great benefit of navigation

In consequence of a proposal made by this astronomer to the Royal Society, the project was formed of measuring accurately the effect of some mountain on the plumb line, in deflecting it from the perpendicular, and Schehallien in Scotland, having been found the most convenient in this island for the purpose, he went into Scotland to conduct the business, by which experiment he shewed, that the sum of the deflections on the two opposite sides was about 11½ seconds of a degree, and proved, to the satisfaction of the whole world the universal attraction of matter From the data resulting from these measures Dr Hutton has computed the mean density of the whole matter in the earth, to be about 4½ times that of common water

The discoveries of Herschel, Piazzi, Harding, and Olbers, form a new æra in astronomy The former of these gentlemen, by his great skill in the construction of large specula, has made telescopes which have opened new views of the heavens and unfolded scenes which excite no less our wonder than our admiration On the 13th of March 1781 he discovered a new primary planet called by him Georgium Sidus, but named the planet Herschel, or Uranus, by foreign astronomers This planet there is reason to believe, was seen by Flamsteed in 1690, by Mayer in 1756, and by Monier in 1769 but to Herschel was reserved the honour of discovering that it was a primary planet belonging to the solar system He has also discovered six satellites belonging to this planet, and two more belonging to Saturn thus has he discovered nine bodies in our system!

And M Piazzi, astronomer royal, at Palermo, discovered on January 1, 1801, the first day of the 19th century, another planet moving in an intermediate orbit between Mars and Jupiter It had been long conjectured by Maclaurin, Baxter, Lambert, Bode, Zach, and others, that there was an intermediate primary planet between Mars and Jupiter, and the discovery has coincided with some of these conjectures in a very extraordinary manner This planet is now distinguished by the name Ceres Ferdinandia Another new and small planet was discovered by Dr Olbers of Bremen, on the 28th of March, 1802 it is called Pallas, and is distant from the sun about the same as Ceres, their orbits, indeed, intersecting each

other Juno is likewise another very small planet discovered by M Harding, at Lilienthal, on the 1st of September, 1804, it is a little farther distant from the sun than Ceres and Pallas A fourth of these small planetary bodies was discovered by Dr Olbers, early in 1807 it is now known by the name of Vesta Indeed we think it highly probable, that as astronomical instruments are improved, and astronomers become more vigilant in their observations, new discoveries of this kind will be made, and our system will be enlarged by the discovery of planets making their excursions beyond the orbit of Georgium Sidus, and some, it is likely, even within the orbit of Mercury, for, if we consider the comparative magnitude of the orbits, it will appear probable, that a spectator at Saturn would see none of the inferior planets except Jupiter, whose greatest elongation from the sun would be about 37°,—Mars would only be seen sometimes when transiting the sun's disc thus, also a spectator at Jupiter would scarcely ever see Venus, one at Mars would probably never see Mercury but when transiting the sun's disc, and in like manner planets below Mercury have hitherto eluded the vigilance of all our observers But we look forward to fresh discoveries with confidence for the increasing zeal and activity of astronomers in every part of Europe will surely be crowned with success and benefit

Before we conclude this history, we must notice the principal labours of scientific men in regard to physical astronomy Among these the most distinguished names after Newton are, Maclaurin, Clairault, T Simpson, Walmesley, Euler, D Alembert, Frisi, Lagrange, Landen, and La place Simpson, in his tracts, directed his attention to the theory of the moon He shewed that the effects of such forces as are proportional to the cosine of an arch z, are explicable, by means of the cosines of that arch and of its multiples, and thus determined a very important point for, since it hence appears, that no terms enter into the equation of the moon's orbit, but what by a regular increase and decrease, do after a certain time return to their former values, it is therefore evident that the mean motion, and the greatest quantities of the several equations, undergo no change from gravity Frisi, in his Cosmographia, applied a similar mode of reasoning to the variations of the obliquity of the ecliptic, which he thus shewed to be confined within certain limits Laplace was conducted farther In the general movement of a system of bodies, such as is actually exemplified in nature, every thing is in motion, not only every body, but the plane of every orbit The mutual action of the planets changes the positions of the planes in which they revolve, and they are perpetually made to depart by a small quantity, on one side or other, each from that plane in which it would go on continually, if their mutual action were to cease The calculus of Laplace, in the first book of his Mecanique Céleste, makes it appear, that the inclinations of these orbits in the planetary system are stable, or that the planes of the orbits oscillate a little, to and fro, on each side of a fixed and immoveable plane This plane is shewn to be one, on which, if every one of the bodies of the system be projected by a perpendicular let fall from it, and if the mass of each body be multiplied into the area described in a given time by ... on the said plane, the sum of all ... shall be a maximum.

... problem of the three bodies, engaged in succession the attention of many eminent philosophers The problem is this having given the masses of three bodies projected from three points given in position, with velocities given in their quantity and direction, and supposing the bodies to gravitate to one another with forces that are as their masses directly and the squares of their distances inversely, to find the lines described by those bodies, and their position, at any given instant or, the problem may be rendered still more universal, by supposing the number of bodies to exceed three To resolve the problem generally, according to either of these enunciations, exceeds the powers even of the most refined analysis but under the conditions with which nature presents it to us, much has been done by Clairault D Alembert Euler, and others Clairault was the first who deduced from his solution of the problem, a complete set of lunar tables, of an accuracy far superior to any thing that had yet appeared, and which when compared with observation, gave the moon's place, in all situations very near the truth Their accuracy, however was exceeded by another set produced by Tobias Mayer of Gottingen and grounded on a comparison of Euler's solution with correct observations The problem of finding the longitude at sea, which was now understood to depend so much on the exactness with which the moon's place could be computed, gave great additional value to these researches, and established a very close connection between the conclusions of theory and the art of navigation Mayer's tables were rewarded by the Board of Longitude in England, and Euler's, at the suggestion of Turgot, by the Board of Longitude in France

Thus, the lunar theory was brought to a very high degree of perfection, and the tables constructed by means of it were found to give the moon's place true to 30 seconds Still, however, there was one inequality in the moon's motion for which the principles of gravitation seemed to afford no account this was what is known by the name of the moon's acceleration Various attempts were made to explain the phenomenon by Halley, and others it was, at length, satisfactorily elucidated by Laplace, who thus gave the finishing touch to the theory of the moon, nearly a century after it had been propounded in the first edition of the Principia See ACCELERATION OF THE MOON

That branch of the theory of disturbing forces which relates to the action of the primary planets on one another, was successfully cultivated between 1740 and 1780 In the course of these researches, the change in the obliquity of the ecliptic before adverted to, came first to be perfectly recognised, and ascribed to the action of the planets, on the earth Euler proved, independently of Frisi, that the change in this obliquity is periodical, that it is not a constant diminution, but a small and slow oscillation never exceeding two degrees altogether on both sides of a mean quantity, by which it alternately increases and diminishes in the course of periods which are not all of the same length, but by which, in the course of ages, a compensation ultimately takes place

Lagrange, struck with the circumstance that the calculus had never given any inequalities but such as were periodical, applied himself to the investigation of a general question, from which he found by a method peculiar to himself and independent of any approximation, that the in

equalities produced by the mutual action of the planets must in effect be all periodical that the periodical changes are confined within narrow limits, that none of the planets ever has been or ever can be a comet moving in a very eccentric orbit, but that the planetary system oscillates as it were round a medium state from which it never deviates far that amid all the changes which arise from the mutual actions of the planets, two things remain perpetually the same, viz the length of the greater axis of the ellipse which the planet describes, and its periodical time round the sun, or, which is the same thing, the mean distance of each planet from the sun and its mean motion remain constant The plane of the orbit varies, the species of the ellipse and its eccentricity change but never, by any means whatever the greater axis of the ellipse, or the time of the entire revolution of the planet The discovery of this great principle, which we may consider as the bulwark that secures the stability of our system, and excludes all access to confusion and disorder must render the name of Lagrange for ever memorable in science, and ever revered by those who delight in the contemplation of whatever is excellent and sublime After Newton s discovery of the elliptic orbits of the planets from gravitation, Lagrange s discovery of their periodical inequalities is, without doubt, the noblest truth in physical astronomy, and in respect of the doctrine of final causes, it may truly be regarded as the greatest of all

Nearly allied to this truth is the following theorem resulting from one of Laplace s investigations If the mass of each planet be multiplied into the square of the eccentricity of its orbit, and this product into the square root of the axis of the same orbit, the sum of all these quantities, when they are added together, will remain for ever the same This sum is a constant magnitude which the mutual action of the planets cannot change Hence, no one of the eccentricities can ever increase to a great magnitude, for, as the mass of each planet is given, as well as its axis, the square of the eccentricity in each is multiplied into a given coefficient, and the sum of all the products so formed is incapable of change Here, therefore, we have another general property indicating the stability of our system within narrow limits Yet it does not follow that this permanency is necessary and unavoidable, under every possible constitution of the planetary orbits for, if the planets did not all move the same way if their orbits were not all nearly circular, if their eccentricities were not small, or, if the law of planetary deflection were different, the permanency of the preceding quantity could not take place Such permanency depends upon conditions which are not necessary in themselves, and is therefore an argument of design in the construction of the universe

The subject of the tides is another, the true theory of which was sketched by Newton, but not completed till long after his time The state of neither mechanical nor mathematical science was such in his time as would enable any one to determine the motions of a fluid, acted upon by three gravitations, and having besides a rotatory motion The dissertations of D Bernoulli, Euler, and Maclaurin, which shared the prize with that of P Cavalleri on the principle of vortices, were admirable but the first man who felt himself in possession of all the principles required in this arduous investigation was Laplace, who, in the years 1775, 1779, and 1790 communicated to the Academy of Sciences a series of memoirs on this subject which he has united and extended in the fourth book of the Mécanique Céleste See Tides. See also Edinburgh Review No 22

The precession of the equinoxes is another interesting subject, to which the attention of Frisi, Walmsley, T Simpson, D'Alembert, Landen Milner, M Young, and Robertson, have been successively directed We have not room to give an account of their labours here but shall rather beg leave to return for a moment to the consideration of the provision made for the permanency of the planetary system Is it necessary, or is it contingent? the effect of an unavoidable, or of an arbitrary arrangement? If the conditions be not necessary, but the result of an arrangement that might have been different, we are then entitled to conclude that it is the effect of wise and benevolent design exercised in the construction of the universe Now this permanency of the system within very narrow limits of deviation from its present state, depends, as we have seen, principally on the law of planetary deflection Had it been directly or inversely as the distance, the deviations would have been such as to have quickly rendered it wholly unfit for its present purposes They would have been very great had the planetary orbits differed much from circles, nay, had some of them moved in the opposite direction The selection of this law, this form of the orbits, and a direction the same way, strikes the mind of a Newton, and indeed any heart possessed of sensibility to moral or intellectual excellence, as a mark of wisdom prompted by benevolence Yet M Laplace, and others, as if infected with a kind of theophobia, are eager to point it out as a mark of fatalism They say, that it is essential to all qualities that are diffused from a centre to diminish in the inverse duplicate ratio of the distance But this is very erroneous, stated thus generally it is a mere geometrical conception We indeed say, that the density of illumination decreases in this proportion, but who says that this is a quality? Whether it be considered as the emission of luminous corpuscles, or an undulation of an elastic fluid, it is not a quality emanating from a centre and even in this estimation it seems gratuitous, whether we shall consider the base of the luminous pyramid, or its whole contents, as the expression of the quantity Nay, if all qualities must diminish at this rate, all action *e distanti* must do the same, for when the distances bear any great proportion to the diameters of the particles, their action deviates insensibly from this law, and is perceived only by the accumulation of its effects after a long time

But we are wandering from the direct purpose of this article the great and deserved celebrity of Laplace must plead our apology for this digression We highly admire and warmly recommend his Celestial Mechanics, but we sincerely regret that his profound investigations should, through some strange propensity, have led him to the conclusion above animadverted upon, instead of cherishing that disposition of the human heart which prompts us to see contrivance wherever we see a nice and refined adjustment of means to ends, and from the admirable beauty of the solar system, to exclaim,

" These are thy glorious works, Parent of good!
Almighty, thine this universal frame,

Thus wond'rous fair; thyself how wond'rous then!
Unspeakable, who sitt'st above these heavens,
To us invisible, or dimly seen
In these thy lowest works, yet these declare
Thy goodness beyond thought, and power divine."
MILTON

The modern writers upon the subject of astronomy are very numerous besides those whose names are mentioned in the preceding history, the most noted and esteemed books are by the following authors Biot, Bonnycastle La Caille, Emerson, Ferguson, D Gregory, O Gregory, Keill, Lalande, Leadbetter, Long, Street, Vince, Wing, Whiston, and Woolsey Of these, the works of Biot, Bonnycastle, Ferguson, and Woolsey, are entertaining popular introductions to the study of astronomy The others are of a more scientific complexion Each has its peculiar merits but the large performances of De Lalande and Professor Vince, are by far the most complete and extensive De Lalande's System of Astronomy is invaluable it has probably tended more to the general promotion of the science, than all the other works which ever appeared upon the subject And Professor Vince's System is certainly the most extensive and useful body of information on this science which has yet been published in Britain

INTRODUCTION TO ASTRONOMY

The world, according to the vulgar opinion, is composed of two principal parts, the earth and the sky The earth appears to be a vast surface nearly flat, which extends itself circularly on all sides when a person changes place upon this surface, he loses sight of certain countries, he discovers others yet he always believes himself at the centre of the extent presented to him As to the sky it appears to us like a canopy stretched over our heads, and concave above to it the sun, moon, and stars, appear attached

The sky exhibiting no difference between its various parts, our eyes do not enable us to ascertain whether it be in motion or at rest But this is not the case with regard to either the sun, the moon, or the stars these luminaries take successively various places, and their motions are visible in all parts of the earth In the morning the sun is seen to rise above the distant mountains, or to spring, as with a sort of effort, from the extremities of the ocean This phenomenon is named the rising of the sun The luminary then runs over the vault of the sky, and at evening sets in the opposite part All the stars follow a similar course they rise successively one after another, in a determinate order,—they pass over the sky, and then set, each in its order, and occupying its own rank and position But the sun surpasses all the others with regard to splendour this luminary alone directs the repose and the labour of man, its presence causes day, its absence night The side of the heavens where the stars rise is named the east, the opposite side where they set is called the west The points of the sea or of the earth to which the view is limited, constitute the horizon, being the place where the stars seem actually to rise and set

The sun and moon appear to us greater than the other heavenly bodies from this we do not immediately appreciate their real magnitude, but the apparent breadth of their disc, or, according to the received expression, their apparent diameter. To have a correct idea of this sensation, it must be recollected that objects become visible by means of the luminous rays they transmit to us When we observe a celestial body, the rays proceeding from the opposite sides of its disc intersect in our eye under a certain angle the arc which measures this angle determines the apparent magnitude of the object, or, at least, its apparent diameter

The permanent stars not offering such a regular disc as to enable the eye to appreciate their contour, they appear only as brilliant points in the sky They, however, retain constantly the same mutual arrangement and the same order, they rise and set constantly at the same points of the horizon, without being liable to any perceptible variations except after very extensive intervals of time Ten others only besides the sun and the moon, make exceptions to this rule in truth they rise and set as the stars do, but on carefully remarking their position, it will be perceived at the end of some days that they have changed their places they no longer accompany the same stars no longer rise and set at the same points of the horizon Hence they are called planets, that is to say wandering stars, from the Greek πλανητης, *wanderer* the others have received, by way of contrast, the name of fixed stars

Besides the planets and fixed stars, there are seen from time to time in the heavens other stars which at first appear very small, slightly luminous and move among the stars very slowly after a little time their brilliancy is increased and their velocity augmented more and more again after a certain time they gradually diminish in a similar manner, and at length are totally lost from the sight These stars are ordinarily followed by a sort of tail, which accompanies them during a part of their appearance sometimes they are surrounded as if by hair, (coma), whence they have obtained the name of comets, that is to say, hairy stars

The planets and comets are not merely distinguished from the other stars by their motions, but they differ also with respect to their tint and their light, which is in general stronger, more brilliant, and less subject to that kind of tremulous impression which is named twinkling or scintillation The luminousness of the planets varies in a way that is very marked, and according to regular periods In fact, some new stars which have appeared at different times among the fixed ones, have shone with a lustre more vivid than that of the planets at the commencement of their appearance, but this great brilliancy has been soon followed by a considerable diminution of lustre, and sometimes by a total disappearance

With regard to the fixed stars, they must necessarily shine by their own light, for if we grant that they consist of gravitating matter, it must be allowed that no star could be near enough to another to be seen by reflected light without a very sensible change of the places of both in consequence of their mutual gravitation, nor would it be possible, on account of the immense distance from us, to distinguish two such bodies from each other

The light of the stars appears to the naked eye to be generally white, being too faint to excite the idea of a particular colour but when it is concentrated by Dr Herschel's large speculums, it becomes in various stars of various hues, and indeed to the naked eye some of the stars appear a little redder, and others a little bluer As to the scintillation or twinkling of the stars, its

cause is not fully ascertained, but it is referred with some probability, as Dr T Young remarks (Lectures, vol 1 pa 490), to changes which are perpetually taking place in the atmosphere, and which affect its refractive density It is said, that in some climates, where the air is remarkably serene, the stars have scarcely any appearance of twinkling

Above two thousand stars are visible to the naked eye, and when a telescope is employed, their number appears to increase without any other limit than the imperfection of the instrument Dr Herschel has observed in the milky way above ten thousand stars in the space of a square degree Lucretius and Dr Halley have argued, that their number must be absolutely infinite, in order that all of them may remain at rest by the opposition of attractions acting in every possible direction, but we are by no means certain that they do remain in perfect equilibrium

The stars, on account of their apparently various magnitudes, have been distributed into several classes or orders Those which appear largest are called stars of the first magnitude, the next to them in lustre, stars of the second magnitude, and so on to the sixth, which are the smallest that are visible to the bare eye This distribution having been made long before the invention of telescopes, the stars which cannot be seen without the assistance of these instruments are distinguished by the name of telescopic stars

The ancients divided the starry sphere into particular constellations, or systems of stars, according as they lay near one another so as to occupy those spaces which the figures of different sorts of animals or things would take up if they were there delineated And those stars which could not be brought into any particular constellation were called unformed stars

This division of the stars into different constellations, or asterisms, serves to distinguish them from one another, so that any particular star may be readily found in the heavens by means of a celestial globe, on which the constellations are so delineated, as to put the most remarkable stars into such parts of the figures as are most easily distinguished The number of the ancient constellations is 48, and upon our present globes about 70 On the best globes are inserted Bayer s letters, the first in the Greek alphabet being put to the biggest star in each constellation, the second to the next, and so on, by which means every star is as easily found as if a name were given to it Thus, if the star γ in the constellation of the ram be mentioned, every astronomer knows as well wha star is meant as if it were pointed out to him in the heavens.

There is also a division of the heavens into three parts 1 The zodiac (ζωδιακὸς), from ζωδίον, *zodion*, an animal because most of the constellations in it which are 12 in number, have the names of animals as Aries the ram, Taurus the bull Gemini the twins, Cancer the crab, Libra the balance Scorpio the scorpion, Sagittarius the archer, Capricornus the goat, Aquarius the water-bearer, and Pisces the fishes The zodiac goes quite round the heavens it is about 16 degrees broad, so that it takes in the orbits of all the old planets, and likewise the orbit of the moon Along the middle of this zone or belt is the ecliptic, or circle which the earth describes annually as seen from the sun and which the sun appears to describe as seen from the earth 2 All that region of the heavens which is on the north side of the zodiac containing 21 constellations And, 3 That on the south side, containing 15

The names of the constellations, and the number of stars observed in each of them by different astronomers, are as follow

The Ancient Constellations		*Ptolemy*	*Tycho*	*Hevelius*	*Flamsteed*
Ursa minor	The Little Bear	8	7	12	24
Ursa major	The Great Bear	35	29	73	87
Draco	The Dragon	31	32	40	80
Cepheus	Cepheus	13	4	51	35
Bootes, *Arctophilax*	Bootes	23	18	52	54
Corona Borealis	The Northern Crown	8	8	8	21
Hercules, *Engonasin*	Hercules kneeling	29	28	45	113
Lyra	The Harp	10	11	17	21
Cygnus, *Gallina*	The Swan	19	18	47	81
Cassiopeia	The Lady in her Chair	13	26	37	55
Perseus	Perseus	29	29	46	59
Auriga	The Waggoner	14	9	40	66
Serpentarius, *Ophiuchus*	Serpentarius	29	15	40	74
Serpens	The Serpent	18	13	22	64
Sagitta	The Arrow	5	5	5	18
Aquila, *Vultur*	The Eagle	15	12	23	71
Antinous	Antinous		3	19	
Delphinus	The Dolphin	10	10	14	18
Equulus, *Equi sectio*	The Horse s Head	4	4	6	10
Pegasus, *Equus*	The Flying Horse	20	19	38	89
Andromeda	Andromeda	23	23	47	66
Triangulum	The Triangle	4	4	12	16
Aries	The Ram	18	21	27	66
Taurus	The Bull	44	43	51	141
Gemini	The Twins	25	25	38	85
Cancer	The Crab	23	15	29	83
Leo	The Lion	35	30	49	95
Coma Berenices	Berenice's Hair		14	21	43
Virgo	The Virgin	32	33	50	110
Libra, *Chelæ*	The Scales	17	10	20	51

The Ancient Constellations		*Ptolemy*	*Tycho*	*Hevelius*	*Flamsteed*
Scorpio	The Scorpion	24	10	20	44
Sagittarius	The Archer	31	14	22	69
Capricornus	The Goat	28	28	29	51
Aquarius	The Water-bearer	45	41	47	108
Pisces	The Fishes	38	36	39	113
Cetus	The Whale	22	21	45	97
Orion	Orion	38	42	62	78
Eridanus, *Fluvius*	Eridanus, *the River*	34	10	27	84
Lepus	The Hare	12	13	16	19
Canis major	The Great Dog	29	13	21	31
Canis minor	The Little Dog	2	2	13	14
Argo Navis	The Ship	45	3	4	64
Hydra	The Hydra	27	19	31	60
Crater	The Cup	7	3	10	31
Corvus	The Crow	7	4	0	9
Centaurus	The Centaur	37	0	0	35
Lupus	The Wolf	19	0	0	24
Ara	The Altar	7	0	0	9
Corona Australis	The Southern Crown	13	0	0	12
Piscis Australis	The Southern Fish	18	0	0	24

The New Southern Constellations

Columba Noachi	Noah's Dove	10
Robur Carolinum	The Royal Oak	12
Grus	The Crane	13
Phœnix	The Phenix	13
Indus	The Indian	12
Pavo	The Peacock	14
Apus, *Avis Indica*	The Bird of Paradise	11
Apis *Musca*	The Bee or Fly	4
Chamæleon	The Cameleon	10
Triangulum Australis	The South Triangle	5
Piscis volans, *Passer*	The Flying Fish	8
Dorado, *Xiphias*	The Sword Fish	6
Toucan	The American Goose	9
Hydrus	The Water Snake	10

Hevelius's Constellations made out of the unformed Stars

		Hevelius	*Flamsteed*
Lynx	The Lynx	19	44
Leo minor	The Little Lion		53
Asterion & Chara	The Greyhound	23	25
Cerberus	Cerberus	4	
Vulpecula & Anser	The Fox and Goose	27	35
Scutum Sobieski	Sobieski's Shield	7	
Lacerta	The Lizard	10	16
Camelopardalus	The Camelopard	32	58
Monoceros	The Unicorn	19	31
Sextans	The Sextant	11	41

Besides the names of the constellations, the ancient Greeks gave particular names to some single stars, or small collections of stars thus, the cluster of small stars in the neck of the bull was called pleiades; five stars in the bull's face, the hyades, a bright star in the breast of Leo, the lion's heart, and a large star between the knees of Bootes, Arcturus

The constellations may be represented on two planispheres projected on a great circle or on the convex surface of a solid sphere, as on the celestial globe, or most perfectly on the concave surface of a hollow sphere If the celestial globe is made use of, after rectifying it to the time of the night, the stars may be found, by conceiving a line drawn from the centre of the globe through any star in the heavens, and its representation upon the globe.

The stars are, in general, dispersed without any regular order, but we may observe in many parts of the heavens that a number of them are so much nearer together than to the rest, as to form a cluster or nebula The ancients had noticed some of the most conspicuous nebulæ but Huygens first directed the attention of modern astronomers to the large one situated in the constellation Orion Herschel has now given us catalogues of 2500 nebulæ many of which can be resolved into separate stars by very high magnifying powers, but others appear to consist of a luminous matter, spread uniformly in the neighbourhood of the several stars to which they seem to belong

It has been conjectured that all stars are disposed in nebulæ, and that those which appear to us to be more widely separated are individual stars of that particular nebula in which we are placed, and of which the marginal parts may be observed in the form of a lucid zone, which is called the milky way, being too distant to allow its single constituent stars to be perceived by the naked eye This opinion, Dr T Young informs us, was first suggested by professor Kant the author of the system of metaphysics called the Critical Philosophy The idea was adopted by Lambert, who considers the largest stars as constituting a distinct nebula placed among a multitude of others which together produce the appearance of a continued zone, and Dr. Herschel has investigated very particularly the figure of a

single nebula, which would be capable of being projected into the form of the milky way. We must not, however, suppose that each of Herschel's 2500 nebulæ can be at all comparable in magnitude to this supposed nebula, since many of them are almost as much resolved by the telescope into single stars as the milky way itself, which would be utterly impossible if the stars which they contain were equally numerous with those of the nebula to which the milky way belongs. Supposing all the stars of this nebula to be as remote from each other as the nearest of them are from the sun, it may be calculated that the most distant are about 500 times as far from us as the nearest, and that light, which is probably 15 or 20 years in travelling to us from Sirius, would be nearly 20000 in passing through the whole diameter of the milky way. A nebula of the same size as this, appearing like a diffused light of a degree in diameter must be at such a distance that its light would require a million years to reach us!

Properly speaking, the stars are not absolutely fixed with respect to each other, for several of them have particular motions which have been discovered by a comparison of accurate observations, made at very distant times. Arcturus, for instance, has a progressive motion, amounting to more than 2 seconds annually. Dr Maskelyne found that, out of 36 stars whose places he ascertained with great precision, 35 had a proper motion. Mr Michell and Dr Herschel have conjectured that some of the stars revolve about others which are apparently situated very near them and perhaps even all the stars may in reality change their places more or less, although their relative situations, and the directions of their paths, may often render their motions imperceptible to us.

Respecting all these arrangements of stars into different systems, Dr Herschel has lately entered into a very extensive field of observation and speculation and has divided them into a number of classes, to each of which he has assigned a distinct character. Some, he supposes, like our sun, to be insulated stars, beyond the reach of any sensible action of the gravitation of others, and around these alone he conceives that planets and comets revolve. Double stars in general, he imagines to be much nearer to each other, so as to be materially affected by their mutual gravitation, and only to preserve their distance by means of the centrifugal force derived from a revolution about their common centre of gravity, an opinion which he thinks, is strongly supported by his own observations of some changes in the positions of double stars. Others again he supposes to be united in triple, quadruple, and still more compound systems. A fourth class consists of nebulæ like the milky way, the clusters of stars being rounded, and appearing brightest in the middle. Groups of stars Dr Herschel distinguishes from these by a want of apparent condensation about a centre of attraction, and clusters by a still greater central compression. A fifth class includes such nebulæ as have not yet been resolved into stars, some of which Dr Herschel supposes to be so remote that the light emitted by them must actually have been two millions of years in travelling to our system. The nebulæ of another description resemble stars surrounded by a bur, or faint disc of light. A diffused milky nebulosity, apparently produced by some cause distinct from the immediate light of any stars, is the next in order: and Dr Herschel has distinguished other more contracted nebulous appearances, in different states of condensation, into the classes of nebulous stars, and planetary nebulæ, with and without bright central points.

Farther, it is fully ascertained that some of the stars have periodical changes of brightness which are supposed to arise either from the temporary interposition of opaque bodies revolving about them, or, still more probably from a rotatory motion of their own which brings at certain periodical times a less luminous part of the surface into our view. Thus, the star Algol, which is usually of the second magnitude becomes at intervals of two days and twenty one hours each, of the fourth magnitude only, and occupies seven hours in the gradual diminution and recovery of its light. Other irregular variations may possibly be occasioned by the appearance and disappearance of spots occurring like the spots of the sun, without any determinate order, or assignable cause, and many stars have, in the course of ages wholly disappeared, and sometimes have been again recovered. Others have made their appearance for a short time, where no star had before been seen. Such a temporary star was observed by Hipparchus 120 years before the christian era, and the circumstance suggested to him the propriety of making an accurate catalogue of all the stars, with their respective situations, which is still extant, having been preserved by Ptolemy, who added 4 stars to the 1022 that it contained. In 1572, Cornelius Gemma discovered a new star in Cassiopeia, which was so bright as to be seen in the daytime, and gradually disappeared in sixteen months. Kepler, in 1604 observed a new star in Serpentarius, more brilliant than any other star or planet, and changing perpetually into all the colours of the rainbow, except when it was near the horizon. It continued visible for about a year. Many other new stars have also been observed at different times. I Young's Lectures, vol. I. pa. 495.

On the Solar System.

The most conspicuous of all the celestial bodies which we have been examining is *the Sun*, that magnificent luminary which occupies the centre of the system that comprehends our earth, together with a variety of other primary and secondary planets, and a still greater number of comets.

The sun is a body nearly spherical, whose diameter is about 883,230 English miles, situated at the centre of the system of the planets. It exerts upon all of them a remarkable influence: it heats them, it enlightens them, and enchains them in their elliptical orbits in virtue of a force varying inversely as the squares of the distances, and directly as the masse.

The sun agrees with the fixed stars in the property of emitting light continually, and in retaining constantly its relative situation with very little variation. It is probable also that these bodies have many other properties in common. The sun is, therefore, considered as a fixed star comparatively near us, and the stars as suns at immense distances from us; and we infer from the same analogy that the stars are possessed of gravitation, and of the other general properties of matter, they are supposed to emit heat as well as light, and it has with reason been conjectured

that they serve to cherish the inhabitants of a multitude of planetary bodies revolving about them

The sun, like many other stars, has probably a progressive motion, which, from a comparison of the apparent motions of a great number of the stars, is supposed to be directed towards the constellation Hercules It is beyond all question that many of the stars have motions peculiar to themselves, and it is not certain that any of them are without such motions it is, therefore, in itself highly probable that the sun may have such a motion And Dr Herschel has confirmed this conjecture by arguments almost demonstrative

Besides this progressive motion the sun is subjected to some small change of place, dependent on the situations of the planetary bodies, which was long inferred from theory only but which has been actually demonstrated by modern observations Supposing all the planets to be in conjunction, or nearly in the same direction from the sun, the common centre of inertia of the system is at the distance of about a diameter of the sun from his centre and since the centre of inertia of the whole system must be undisturbed by any reciprocal actions of the bodies composing it, the sun must describe an irregular orbit round this centre, his greater distance from it being equal to his own diameter We may form an idea of the magnitude of this orbit by a comparison with the orbit of the moon a body revolving about the sun, in contact with his surface, must be nearly twice as remote from his centre as the moon is from the earth, and the sun's revolution about the common centre of gravity of the system must therefore be, where it is most remote, at four times the distance of the moon from the earth

The sun revolves on his axis in twenty-five days ten hours with respect to the fixed stars, this axis is directed towards a point about half way between the pole star and Lyra, the plane of the rotation being inclined a little more than seven degrees to that in which the earth revolves The direction of this motion is from west to east, terms which we can only define from our pre supposed knowledge of the stars, by saying that the motion is such, that a point of the sun s surface at first opposite Aries, moves towards Taurus All the rotations of the different bodies which compose the solar system, as f [illegible], they have been ascertained, are in the same direction

The time and direction of the sun s rotation is ascertained by the change in the situation of the spots, which are usually visible on his disc, and which some astronomers suppose to be elevations, but others, apparently with better reason, to be excavations or deficiencies in the luminous matter covering the sun's surface These spots are frequently observed to appear and disappear, and they are in the mean time liable to great variations, but they are generally found about the same points of the sun's surface Lalande imagined that they were parts of the solid body of the sun, which by some agitations of the luminous ocean, with which he conceived the sun to be surrounded, are left nearly or entirely bare Dr Wilson and Dr. Herschel are disposed to consider this ocean as consisting rather of a flame than of a liquid substance, and Dr Herschel attributes the spots to the emission of an aeriform fluid, not yet in combustion, which displaces the general luminous atmosphere, and which is afterwards to serve as fuel for supporting the process; hence he supposes the appearance of copious spots to be indicative of the approach of warm seasons on the surface of the earth, and he has attempted to maintain this opinion by historical evidence The exterior luminous atmosphere has an appearance somewhat mottled some parts of it, appearing brighter than others have generally been called *faculæ* but Dr Herschel distinguishes them by the name of ridges and nodules The spots are usually surrounded by margins less dark than themselves which Dr Herschel calls shallows and which he considers as parts of an inferior stratum consisting of opaque clouds, capable of protecting the immediate surface of the sun from the excessive heat produced by combustion in the superior stratum, and perhaps of rendering it habitable to animated beings Young, vol 1 pa 501

The planetary system comprises at least thirty bodies, without including comets Among these thirty bodies the sun is the only one which is really phosphoric, or that shines with a lustre which is, properly speaking, its own All the others are opake, that is to say, they intercept the luminous fluid, and are only rendered visible by means of reflected light Eleven of these bear the name of *planets*, the other eighteen are known under that of *secondary planets* or *satellites*

The planets perform their revolutions about the sun, in elliptical curves differing but little from circles and of which the centre of the sun (or rather the common centre of inertia of the whole system) occupies one of the foci Commencing with that which is nearest the sun, they have the following disposition *Mercury*, *Venus*, *the Earth*, *Mars*, *Ceres*, *Pallas*, *Juno*, *Vesta*, *Jupiter*, *Saturn*, *Uranus*, or *Herschel* See Pl 10

Each of the planetary orbits is in a plane which passes through the centre of the sun

The plane of the earth s orbit is named the plane of the ecliptic We conceive it prolonged on all sides, and astronomers observe the situations of the planes of the other orbits by referring them to this

All the planets move in their orbits from west to east The velocities with which they move are not invariable, but the areas described by their radii vectores are always proportional to the times The motion of the planets is likewise so much the more rapid as they are more remote from the sun [in] such manner that the magnitude of the orbit and the slowness of the motion concur in augmenting the durations of their sidereal revolutions

Mercury and Venus are nearer the sun than the earth is, on which account they are called *inferior* or *interior* planets Those which are farther from the sun than the earth are, on the contrary, called *superior* or *exterior* planets

The *inferior planets* can never be in opposition to the sun (See OPPOSITION), but they will be found twice in conjunction with that luminary during the course of their sidereal revolution first, when they are found between the sun and the earth secondly, when the sun is between the earth and the planets. See CONJUNCTION

The *inferior planets* present different phases, when they are contemplated through the medium of telescopes these appearances are more perceptible for Venus than for Mercury, and depend upon the proper motion of those planets If this motion be combined with that of the earth in its

orbit which is effected more slowly by reason of its greater distance from the sun, new appearances will be found to arise, such as the direct motion of those planets in the inferior conjunction, and their retrograde motion in the superior conjunction See *Apparent Station, Station, Retrogradation*, &c

The orbits of the superior planets include that of the earth, at the same time that the velocity of the earth is greater than those of the superior planets hence it results that the earth in its motion passes between these planets and the sun, which causes them to appear in opposition to that luminary In the opposition they have a motion apparently retrograde, it is direct in the conjunction, as that of Venus and Mercury is in their superior conjunctions

Some of the planets, as the Earth, Jupiter, Saturn and Uranus have moons or satellites, which turn about them in like manner as they revolve about the sun Thus the earth has one moon or satellite Jupiter four, Saturn seven, and Uranus six See MOON and SATELLITES

With respect to these satellites or secondary planets, the following remarkable circumstance takes place The moon the four satellites of Jupiter, and one of Saturn, are found by observation to turn about an axis in the same time as they respectively revolve about their primaries And although it has not yet been ascertained from observations whether the same be true for the other satellites of Saturn and those of Uranus, yet from the uniformity which obviously pervades the system, we conclude that the same is true for all the secondaries

The planet Saturn is encompassed with a thin flat *ring*, or, as it is now found, with two rings, lying one within the other edgewise toward the planet, and detached from it Their planes pass through the centre of Saturn If a circular annulus be cut out of a card, and divided into two parts by a concentric circle, leaving the inner breadth about three times that of the outer, and a ball be then put within of such a size that the space between the ball and the annulus may be a little larger than the breadth of the annulus, a representation will thus be obtained of Saturn and his two rings That side next the sun is bright like the body of the planet The rings revolve in their own plane, and not being of a regular figure, their centre of inertia is at a small distance from the centre of Saturn M Laplace computed the time of the revolution to be 10h 32m 36s, agreeing very nearly with the time found by Dr Herschel from observation

If the mean distances either of the planets or of their satellites be compared with the duration of their sidereal revolutions, it will be easy to trace the beautiful relation discovered by Kepler, namely, that while several bodies turn about the same point, the squares of the periodical times are respectively as the cubes of their mean distances from that point and, by combining this law with the theorem of Huygens, namely, that when the squares of the periodical times of several bodies circulating about the same point, are respectively as the cubes of the distances from that point, the central forces which animate them are in the inverse ratio of the squares of the same distances, it will be easy to discover the law of gravitation, and, as it were, to unveil the mechanism of the planetary system

We shall now present the reader with some tables exhibiting a brief view of the solar system

Duration of the sidereal revolutions of the planets, or of their periodic times

Mercury - - -	87 969255 days
Venus - - -	224 700817
The Earth - -	365 256384
Mars - -	686 979579
Ceres	1680 000000
Pallas	1681 000000
Juno	2007 500000
Vesta	
Jupiter	4332 602208
Saturn	10759 077213
Uranus	30689 000000

II *Semiaxes major of the planetary orbits, or their mean distances from the sun, that of the earth, which is 95 millions of English miles, being represented by unity*

Mercury - -	0 387100
Venus - -	0 723332
The Earth - - -	1 000000
Mars - -	1 523693
Ceres - - -	2 776755
Pallas -	2 776909
Juno - -	2 876731
Jupiter - - - -	5 202778
Saturn - -	9 538785
Uranus - -	19 183475

III *Relations of excentricity to the semiaxis major (unity)*

Mercury -	(for 1750) -	0 205513
Venus - - -	Do - -	0 006885
The Earth -	Do - -	0 016814
Mars - - -	Do - -	0 093088
Ceres -	(for 1805) -	0 790000
Pallas - - -	Do - -	0 246300
Juno - -	Do - -	0 250000
Jupiter - -	(for 1750)	0 048077
Saturn -	Do - -	0 056223
Uranus - -	Do - - -	0 046683

IV *Inclination of orbits to the ecliptic*

Mercury -	(A D 1750) -	7 0000
Venus -	- Do - -	3 3930
The Earth -	Do - -	0 0000
Mars - - -	Do - -	1 8501
Ceres - -	(A D 1805) -	10 6167
Pallas -	- Do - -	33 7500
Juno - - -	- Do - - -	21 0000
Jupiter -	(A D 1750) -	1 3172
Saturn - - -	Do -	2 4986
Uranus - -	Do - -	0 7706

V *Diameters of the planets, the diameter of the earth (7950 English miles) being assumed as unity.*

Mercury -	$\frac{7}{17}$ -	Venus -	$\frac{33}{34}$
The Earth	1 -	Mars - - -	$\frac{5}{9}$
Ceres -	$\frac{100}{488}$ -	Pallas - - -	$\frac{100}{377}$
Juno -	$\frac{100}{566}$ -	Jupiter - -	$11\frac{2}{5}$
Saturn -	$10\frac{1}{18}$ -	His Ring -	$23\frac{1}{2}$
Uranus -	$\frac{100}{28}$ -	The Moon - -	$\frac{2}{7}$
The Sun -	$112\frac{1}{4}$		

VI *Rotations of the planets*

	d	*h*	*m*
Mercury - -	unknown		
Venus - - - -	0	23	20
The Earth - -	0	23	$56\frac{1}{15}$
The Moon - -	27	7	$43\frac{1}{16}$
Mars - - - -	0	24	40
Jupiter - - -	0	9	56
Saturn - - -	0	10	17
Uranus - - -	unknown		

The actual masses of the planets have been investigated upon principles which may be here stated in a narrow compass The forces which solicit two bodies moving circularly are in a ratio composed of the masses, the distances from the centre, and the inverse square of the periodic times (see CENTRAL FORCES) whence it results that the gravity of one of the satellites towards its planet, is to that of the earth towards the sun, as the mean distance of the satellite from the centre of its planet, divided by the square of its periodic time, is to the mean distance of the earth from the sun, divided by the square of its periodic time or, expressing these gravitating tendencies by G, g the mean distances by R, r the periodic times by T, t we have $G \quad g \quad \frac{R}{T^2} \quad \frac{r}{t^2}$ But, denoting by M the mass of the sun, and by m that of the planet about which the satellite revolves, we have by the nature of gravitation $G \quad g \quad \frac{M}{R^2} \quad \frac{m}{r^2}$ therefore, $\frac{R}{T^2} \quad \frac{r}{t^2} \quad \frac{M}{R^2} \quad \frac{m}{r^2}$, and, consequently, $\frac{R^3}{T^2} \quad \frac{r^3}{t^2} \quad M \quad m$

By applying this result to the planets which have satellites it is easy to find the value of their masses, for, we know the radii of the orbits of the satellites, as well as the length of their sidereal revolutions, or their periodic times Taking the cubes of the radii of these orbits, and dividing them successively by the squares of the periodic times, the quotients will give the values of the masses of the bodies about which the satellites circulate

As to the planets which have not satellites Laplace has deduced the values of the masses of Venus and Mars, from the secular diminution of the obliquity of the ecliptic, and the acceleration of the moon's mean motion The mass of Mercury was inferred from its volume, supposing the densities of that planet and the earth reciprocally as their mean distances from the sun Mecanique Celeste, tome iii pa 64, Exposition du Systeme du Monde, ed 2 pa 193

Thus was deduced the following table

VII *Masses of the planets, that of the sun being taken for unity*

Mercury - - - - -	$\frac{1}{[illegible]}$
Venus	
The Earth	
Mars	
Uranus	
The Moon	$\frac{1}{68\ 5} \times \frac{}{329620}$

The densities of bodies are in the direct ratio of their masses, and the inverse ratio of the volumes, and when bodies are nearly spherical, the volumes are as the cubes of their radii, whence it results that the densities are then as masses divided by the cubes of the radii. By this process we find the following numbers for the mean densities of the planets, that of the sun being assumed as unity

VIII *Densities of the Planets*

Mercury - - -	10·1743
Venus - - - - -	5·0440
The Earth - - - -	3 9393
Mars - - - - -	2 6734
Jupiter - - - - -	0 8601
Saturn - - - - -	0 4951
Uranus - - - - -	0 1376
The Moon - - - -	2 4656

For Dr Hutton's results on this subject, the reader may consult O Gregory's Astronomy, pa 247

Besides the bodies which revolve completely round the sun, within the limits of our observation, there are others, of which we only conclude from analogy that they perform such revolutions These are the comets they generally appear attended by a nebulous light, either surrounding them as a coma, or stretched out to a considerable length as a tail, and they sometimes seem to consist of such light only Their orbits are so eccentric, that in their remoter situations the comets are no longer visible to us, although at other times they approach much nearer to the sun than any of the planets for the comet of 1680, when at its perihelion was at the distance of only one sixth of the sun's diameter from his surface Their tails are often of great extent, appearing as a faint light, directed always towards a point nearly opposite to the sun It is quite uncertain of what substance they consist, and it is difficult to determine which of the conjectures respecting them is the least improbable See COMET

Nearly 500 comets are recorded to have been seen at different times and the orbits of about 100 have been ascertained with tolerable correctness but we have no opportunity of observing a sufficient portion of the orbit of any comet, to determine with accuracy the whole of its form as an ellipsis, since the part which is within the limits of our observation does not sensibly differ from the parabola

The last comet which has been observed was seen in the autumn of 1807 It was distinctly seen by the naked eye for about six weeks in September and October, and the elements, as far as they had been determined when this treatise was sent to press, were as below

	s	°	′
Longitude of the ascending node	8	27	15
Inclination of the orbit - -		65	27
Longitude of the perihelion - -	8	27	45
Perihelion distance in English miles		60763000	
Arrival at perihelion	Sept 17d	0h	3 m

Two comets at least, or perhaps three, have been recognised in their return A comet appeared in 1770 which Prosperin suspected to move in an orbit materially different from a parabola Mr Lexell determined its period to be five years and seven months, and its extreme distances to be between the orbits of Jupiter and of Mercury but it does not appear that any subsequent observations have confirmed his theory

Dr Halley foretold the return of a comet about 1758, which had appeared in 1531, in 1607, and in 1682 at intervals of about seventy-five years, and with Clairaut's farther correction for the perturbations of Jupiter and Saturn, the time agreed within about a month The mean distance of this comet from the sun must be less than that of

Uranus or Herschel Dr Halley also supposed the comet of 1680 to have been seen in 1106, in 531, and in the year 44 before Christ, having a period of 575 years, and it has been conjectured that the comets of 1556 and 1264 were the same, the interval being 292 years, a conjecture which will either be confirmed or confuted in the year 1848 T Young's Lectures, 1813

Some useful information on the subject of comets is given in Ch 21 of O Gregory's Astronomy, and several very striking conjectures in Lambert's Letters on Cosmogony But after all, it must be acknowledged that the philosophy of comets is, at present, very imperfect The prediction of Seneca remains yet to be accomplished, wherein he says "The time will come when the nature of comets and their magnitudes will be demonstrated, and the routs they take, so different from the planets explained Posterity will then wonder, that the preceding ages should be ignorant of matters so plain and easy to be known"

On the Laws of Gravitation

It now remains that we endeavour to explain to the reader, the nature and operation of that extensive and general principle from which the analogies that obtain in the motion of the heavenly bodies naturally flow, that invisible chain which binds together so many bodies in an indissoluble connection, and yet does not oblige them to come into immediate contact This explanation we shall give nearly in the words of Dr T Young, as below

It was first systematically demonstrated by sir Isaac Newton, that all the motions of the heavenly bodies, which have been described, may be deduced from the same force of gravitation which causes a heavy body to fall to the earth he has shewn that, in consequence of this universal property of matter, all bodies attract each other with forces decreasing as the squares of the distances increase, and of later years the same theory has been still more accurately applied to the most complicated phenomena We are at present to take a general view of the operation of this law, in the same order in which the affections of the celestial bodies have been enumerated

The bodies which exist in nature are never single gravitating points so that, in order to determine the effects of their attraction we must suppose the actions of an infinite number of such points to be combined It was shewn by Newton that all the matter of a spherical body or of a spherical surface, may be considered, in estimating its attracting force on other matter, as collected in the centre of the sphere The steps of the demonstration are these a particle of matter, placed at the summit of a given cone or pyramid, is attracted by a thin surface, composed also of attracting matter, occupying the base of the cone, with equal force, whatever may be the length of the cone, provided that its angular position remain unaltered hence it is easily inferred that if a gravitating point be placed any where within a hollow sphere, it will remain in equilibrium, in consequence of the opposite and equal action of the infinite number of minute surfaces, terminating the opposite pyramids into which the sphere may be divided it is also demonstrable by the assistance of a fluxional calculation, that a point placed within the surface is attracted by it, precisely in the same manner as if the whole matter which it contains were collected in the centre, consequently the same is true of a solid sphere, which may be supposed to consist of an infinite number of such hollow spheres. If, however, the point were placed within a hollow sphere, it would be urged towards the centre, by a force which is simply proportional to its distance from that centre. This proposition tends very much to facilitate all calculations of the attractions of the celestial bodies, since all of them are so nearly spherical, that their action on any distant bodies is the same as if the whole of the matter of which they consist were condensed into their respective centres, but, if the force of gravity varied according to any other law than that which is found to prevail, this simplification would no longer be admissible, even with respect to a sphere

It can scarcely be doubted that the power of gravitation extends from one fixed star to another, although its effects may in this case be far too inconsiderable to be perceived by us It may possibly influence the progressive motions of some of the stars, and if, as Dr Herschel supposes, there are double and triple stars revolving about a common centre, they must be retained in their orbits by the force of gravity Dr Herschel also imagines that the motion of our sun is in some measure derived from the same cause, being directed nearly towards a point in which two strata of the milky way meet, the attraction of the stars, other things being equal, must, however, be proportional to their brightness, and that part of the heavens to which the sun is probably moving appears to afford less light than almost any other part, nor does the hemisphere of which it is the centre abound so much in bright stars as the opposite hemisphere If Sirius were a million times as far from the sun as the earth, and if he should descend towards the sun by means of their mutual gravitation only, he would move, on a rough estimate, but about forty feet in the first year, and in 1000 years only 8000 miles

The sun's change of place dependent on the relative situation of the planets is so inconsiderable, that it escaped observation until its existence had been deduced from theory Not but that this change would be sufficiently conspicuous if we had any means of detecting it, since it may amount in the whole to a distance equal to twice the sun's diameter or seven times the distance of the moon from the earth, and this change is generally deducible from the general and unquestionable law of mechanics, that the place of the centre of inertia of a system cannot be changed by any reciprocal or mutual action of the bodies composing it, the action of gravity being found to be perfectly reciprocal But the earth accompanies the sun in great measure in this aberration, and the other planets are also more or less affected by similar motions, so that the relative situations are much less disturbed than if the sun described this irregular orbit by the operation of a cause foreign to the rest of the system

The simple revolution of a body in a given plane, indicates at first sight the existence of an attractive force directed to some point within the orbit, and the Keplerean law of the equality of the arcs described in equal times by a line drawn from each planet to the sun agrees precisely with what is demonstrable of the effects of central forces, and points at once to the sun as the centre of attraction of the system. And since the orbits of the planets are elliptical, and the sun is placed in one of the foci of each, it may be mathemati-

cally demonstrated that the force directed to the sun must increase as the square of the distance decreases, and vice versa See ATTRACTION

The times of the revolution of the planets are also in perfect conformity with the laws of gravitation, that is, the squares of the times are proportional to the cubes of the mean distances from the sun It was easy to infer, from what Huygens had already demonstrated of centrifugal forces, that this Keplerean law must be true of bodies revolving in circles by the force of gravitation, but Newton first demonstrated the same proportion with respect to elliptic orbits, and shewed that the time of revolution in an ellipsis is equal to the time of revolution in a circle, of which the diameter is equal to the major axis of the ellipse, or the semidiameter to the mean distance of the planet

The universality of the laws of gravitation, as applied to the different planets, shews also that the matter of which they are composed is equally subjected to its power, for if any of the planets contained a portion of an inert substance, requiring a force to put it in motion, and yet not liable to the force of gravitation, the motion of the planet would be materially different from that of any other planet similarly situated

The deviations of each planet from the plane of its orbit, and the motions of its nodes or the points in which the orbit intersects the plane of the ecliptic, as well as the motions of the aphelion, or the point where the orbit is remotest from the sun, have also been deduced from the attractions of the other planetary bodies, but the calculations of the exact quantities of these perturbations are extremely intricate, In general, each of the disturbing forces causes the nodes to have a slight degree of retrograde motion, but on account of the peculiar situation of the orbits of Jupiter and Saturn, it happens that the retrograde motion of Jupiter's node, on the plane of the orbit of Saturn, produces a direct motion on the ecliptic, so that the action of Saturn tends to lessen the effect of the other planets in causing a retrograde motion of Jupiter s nodes on the ecliptic

The secular diminution of the obliquity of the ecliptic, or that slow variation of its position, which is only discovered by a comparison of very distant observations, is occasioned by the change of position of the earth's orbit, in consequence of the attractions of the other planets, especially of Jupiter It has been computed that this change may amount in the course of many ages to 10° or 11°, with respect to the fixed stars but the obliquity of the ecliptic to the equator can never vary more than two or three degrees, since the equator will follow, in some measure, the motion of the ecliptic

The mutual attraction of the particles of matter composing the bulk of each planet would naturally dispose them, if they were either wholly or partially fluid, to assume a spherical form, but their rotatory motion would require, for the preservation of this form, an excess of attraction in the equatorial parts, in order to balance the greater centrifugal force arising from the greater velocity of their motion but since the attractive force of the sphere on the particles at an equal distance from its centre is every where equal, the equatorial parts would necessarily recede from the axis, until the greater number of particles, acting in the same column, compensated for the greater effect of the centrifugal force The form would thus be changed from a sphere to an oblate or flattened spheroid, and the surface of a fluid either wholly or partially covering a solid body must assume the same figure, in order that it may remain at rest The surface of the sea is, therefore, spheroidal, and that of the earth only deviates so far from a spheroidal figure, as it is above or below the general level of the sea.

The action of the sun and moon on the prominent parts about the earth s equator, produces a slight change of the situation of its axis, in the same manner as the attraction of the other planets occasions a deviation from the plane of its orbit Hence arises the precession of the equinoxes, or the retrograde motion of the equinoctial points, amounting annually to about 50 seconds The nutation of the earth's orbit is a small periodical change of the same kind, depending on the position of the moon's nodes, in consequence of which, according to Dr Bradley s original observations, the pole of the equator describes in the heavens a little ellipsis of which the diameters are 16 and 20 seconds The same cause is also concerned in modifying the secular variation of the obliquity of the ecliptic, and, on the other hand, this variation has a considerable effect on the apparent precession of the equinoxes On account of the different quantity of the precession at different times, the actual length of the tropical year is subjected to a slight variation, it is now 4 or 5 seconds shorter than it was in the time of Hipparchus The utmost change that can happen from this cause amounts to 4[illegible] seconds

The exact computation of the moon s motion is one of the most difficult as well as important problems in astronomy, but it is easy to understand, in general, how the difference in the quantity and direction of the sun's actions on the moon and earth may cause such a derangement of the moon s gravitation towards the earth that the inclination of the orbit must be variable, that the nodes must have a retrograde, and the apsides a direct motion, and that the velocity of the moon must often be different from that which she would have, according to the Keplerean law, in a simple elliptic orbit

For the sun's attraction, as far as it acts equally on the earth and the moon, can have no effect in disturbing their relative position being always employed in modifying their common annual revolution, but the difference of the forces occasioned by the difference of distances always tends to diminish the effect of their mutual attraction, since the sun acts more powerfully on the nearer than on the remoter of the two bodies The difference of the directions in which the sun acts on the earth and moon, produces also a force which tends in some degree to bring them nearer together, but this force is, on the whole, much smaller than the former, and the result of both these disturbing forces, is always directed to some point in the line which joins the earth and the sun, on the same side of the earth with the moon It is obvious that when the nodes are also in this line the disturbing force can have no effect either on their position or on the inclination of the orbit, since it acts wholly in the plane of that orbit, but when they are in any other situation the disturbing force must cause a deviation from the plane towards the side on which the sun is situated, so that the inclination of the orbit increases and decreases continually and equally, but whatever may be the position of the nodes, it will appear that they must recede during the greater part of the moon's revolution, and advance during the smaller

When the disturbing force tends to separate the earth and moon, it deducts from the gravitation of the moon towards the earth a portion which increases with the distance, and therefore causes the remaining force to decrease more rapidly than the square of the distance increases; and the reverse happens when the disturbing force tends to bring the earth and moon nearer together; but the former effect is considerably greater than the latter. Now, in the simple ellipsis when the body descends from the mean distance, the velocity continually prevails over the attractive force, so as to turn away more and more the direction of the orbit from the revolving radius, until at a certain point, namely, the lower apsis, it becomes perpendicular to it: but if the central force increase in a greater proportion than is necessary for the description of the ellipsis, the point where the velocity prevails over it will be more remote than in the ellipsis, and this is expressed by saying that the apsis moves forwards. When, on the contrary, the force varies more slowly, the apsis has a retrograde motion. Since therefore the force attracting the moon towards the earth increases on the whole, a little more rapidly than the square of the distance decreases, the apsides must have, on the whole, a direct motion. A similar theory is applicable to the mutual perturbations of the primary planets.

The secular acceleration of the moon's mean motion which had long presented a difficulty amounting almost to an exception, against the sufficiency of the theory of gravitation, has at last been satisfactorily deduced by M. Laplace from the effect of the gradual change of the eccentricity of the earth's orbit, which is subject to a very slow periodical variation, and which causes a difference in the magnitude of the sun's action on the lunar revolution. See ACCELERATION.

The perfect coincidence of the period of the moon's rotation with that of a mean revolution has been supposed to be in some degree an effect of the attraction exerted by the earth on a prominent part of her surface; there are, however, many reasons to doubt of the sufficiency of the explanation. If the periods had originally been very nearly equal, we might imagine that the motion of the earth would have produced a libration or oscillation in the position of the moon, retaining it always within certain limits with respect to the earth: no libration is however, observed that can be derived from any inequality in the moon's rotation; and it has very properly been suggested that the same attraction towards the earth ought to have made the moon's axis precisely perpendicular to the plane of her orbit, instead of being a little inclined to it.

The orbits of the comets afford no very remarkable singularity in the application of the laws of gravity, excepting the modifications which depend upon their near approach to the parabolic form, and the great disturbance which their motions occasionally suffer, when they happen to pass through the neighbourhood of any of the larger planets. The velocity of a comet in its perihelion is such that its square is twice as great as the square of the velocity of a body revolving in a circle at the same distance. It was determined by Halley and Clairault, that the attractions of Jupiter and Saturn would delay the return of the comet of 1759 about 618 days, and the prediction was accomplished within the probable limits that they had assigned for the error of the calculation. T. Young's Lectures, vol. i. pa. 522. See also Biot Astronomie Physique, pa. 553, and Laplace Mecanique Celeste, tomes 1 and 3. See farther the articles ABERRATION, COMETS, ECLIPSES, PARALLAX, SEASONS, SYSTEM, TIDES, &c. in this work.

For a view of the solar system, turn to plate 19; and for the telescopic inverted appearances of Mars, Jupiter, Saturn, and the Moon, plate 20. The figures and letters on the moon mark the spots, whose names, &c. are as below, according to Riccioli and Hevelius.

1	Grimaldus	or	Palus Mareotis
2	Galileus		Mons Audus
3	Aristarchus		Mons Porphyrites
4	Keplerus		Loca paludosa
5	Gassendus		Mons Cataractes
6	Schikardus		Mons Troicus
7	Harpalus		Insula sinus hyperborei.
8	Heraclides		Caput Mulieris
(b)	Vulcanus		
9	Lansbergius		Insula Malta
10	Reinoldus		Mons Neptunus
11	Copernicus		Mons Ætna
12	Helicon		Insula erroris
13	Capuanus		Regio Cassiotis
14	Bulialdus		Insula Creta
15	Eratosthenes		Insula Vulcania
16	Timocharis		Insula Corsica
17	Plato		Lacus niger major.
18	Archimedes		
(a)	Aratus		
19	Insula sinus medii		
20	Pitatus		Mare mortuum
21	Tycho		Mons Sinai
22	Eudoxus		Mons Carpathes
23	Aristoteles		Mons Serrorum
24	Manilius		Insula Besbicus
25	Menelaus		Byzantium
26	Hermes		Mons Bodinus
27	Dionysius		
(a)	Albategnius		
29	Plinius		Promontorium Acherusia
30	S. Theophilus		Mons Moschi
31	Tracastorius		Lacus Thospitis
32	Censorinus		Promontorium acutum.
33	Messala		
34			Promontorium Somnii
35	Proclus		Mons Corax
36	Cleomedes		Montes Riphaei
37	Snellius		Mons Paropamisus
38	Petavius		Petra Sogdiana
39	Langrenus		Insula Major
40	Taruntius		Sinus Phasianus
A	Mare Humorum		
B	Mare Nubium		
C	Mare Imbrium		
D	Mare Nectaris		
E	Mare Tranquillitatis		
F	Mare Serenitatis		
G	Mare Foecunditatis.		
H	Mare Crisium		

ASTROSCOPE, an astronomical instrument, composed of two cones, on whose surface the constellations, with their stars, are delineated, so that the stars may be known by it.

ASTROSCOPIA, the art of observing and examining the stars, by means of telescopes.

ASTRO THEOLOGY, s. (*astrum* and

theologia, Lat.) Divinity founded on the observation of the celestial bodies (*Derham*.)

ASTROTHESIA, is used by some for a constellation or collection of stars in the heavens.

ASTRUM, or ASTRON, a constellation, or assemblage of stars: in which sense it is distinguished from Aster, which denotes a single star.

ASTURIAS, an ancient kingdom of Spain. It is divided into two parts, Asturia d'Oviedo, and Asturia de Santillana, and is bounded on the W. by Gallicia, on the N. by the Ocean, on the E. by Biscay, and on the S. by Old Castile and Leon. In this province are mines of gold, lapis lazuli, and vermilion. The eldest son of the king of Spain is styled Prince of Asturias.

ASTYAGES. The most celebrated of this name is the son of Cyaxares. He was the last king of Media, and was father to Mandane, whom he gave in marriage to Cambyses, an ignoble person of Persia, because he was told by a dream, that his daughter's son would dispossess him of his crown. From such a marriage he hoped that none but mean and ignorant children could be raised, but he was disappointed, and though he had exposed his daughter's son by the effects of a second dream, he was deprived of his crown by his grandson, after a reign of 35 years, 559 B. C.

ASTYPALÆA, in ancient geography, an island of Asia in the Cretan sea, where, according to Cicero, (De Nat. Deor. b. iii. c. 18,) divine honours were rendered to Achilles.

ASUNDER. *ad.* (asundran, Sax.) Apart, separately, not together (*Davies*)

ASYLUM, (from the privative α, and συλαω, *I hurt*, because no person could be taken from an asylum without sacrilege,) a sanctuary or place of refuge, where a criminal who shelters himself is deemed inviolable and not to be touched by any officer of justice.

Some pretend that the first asylum of Greece was that which was designed by the oracle of Jupiter Dodonæus, mentioned by Pausanias, who assures us that the Athenians obeyed the oracle, and granted their lives to all those who fled for refuge into the Areopagus to the altars of the goddesses.

The same Pausanias tells us, that the Phliasians very much revered a temple of the goddess Hebe, to which this privilege was granted, that all criminals should find there the pardon of their crimes, without any exception whatsoever, and that they fastened their chains to trees which were before the temple. This author elsewhere mentions a temple of Minerva in Peloponnesus, where criminals were so strongly protected, that none durst so much as demand them back again: but this historian has also given us what is more remarkable concerning the antiquity of sanctuaries, or places of refuge: for he says, that because Neoptolemus the son of Achilles had put Priamus to death, although he retired near the altar of Jupiter Herceus, yet he was killed near the altar of Apollo of Delphos, from whence it is called the punishment of Neoptolemus, when one suffers the same mischief which he had done to another. Thus the asyla of altars and of temples was ancient in his time. About the time of Solomon, and of the foundation of the temple of Jerusalem, there is an asylum mentioned in the Book of Kings.

But the asylum of the altar among the Israelites is far more ancient than that of the temple of Solomon, and the time of Homer or the Trojan war; for it is mentioned in Exodus, as a thing established in Moses's days.

The asylum of the temple of Diana at Ephesus, was one of the most famous. Strabo tells us, that several princes allowed it sometimes a larger, and sometimes a less extent beyond the temple itself.

There were whole cities of refuge among the Israelites, which were counted asyla; also the league of the people of Smyrna with king Seleucus shews us, that king granted the privilege of being an asylum to the whole city of Smyrna.

The whole island of Samothrace likewise enjoyed the same privilege, according to Titus Livius.

Herodotus assures us, that from the Trojan war there was a temple of Hercules in Egypt, whither bond slaves fled, and after they had received the marks or badges of that god, to whom they had devoted themselves, they could never be retaken by their masters.

The emperors Honorius and Theodosius granting the like immunities to churches, the bishops and monks laid hold of a certain tract or territory, without which they fixed the bounds of the secular jurisdiction: these privileges were soon extended not only to the churches and churchyards, but also to the bishops' houses, whence the criminal could not be removed without a legal assurance of life, and an entire remission of the crime. But in the course of time these asyla, or sanctuaries were stripped of most of their immunities, because they served to make guilt and libertinism more abandoned. See CITIES OF REFUGE.

ASYMMETRY, the want of proportion, otherwise called incommensurability, or the relation of two quantities which have no common measure, as between 1 and $\sqrt{2}$, or the side and diagonal of a square.

ASYMPTOTE, (from α priv. συν, *with*, and πιπτω, *I fall*, incoincident,) is properly a right line, which approaches continually nearer and nearer to some curve, whose asymptote it is said to be, in such sort, that when they are both indefinitely produced, they are nearer together than by any assignable finite distance; or it may be considered as a tangent to the curve when conceived to be produced to an infinite distance. Two curves are also said to be asymptotical, when they thus continually approach indefinitely to a coincidence: thus, two parabolas, placed with their axes in the same right line, are asymptotes to one another.

Of lines of the second kind, or curves of the first kind, that is, the conic sections, only the

hyperbola has asymptotes, which are two in number. All curves of the second kind have at least one asymptote, but they may have three. And all curves of the third kind may have four asymptotes. The conchoid, cissoid, and logarithmic curve, though not reputed geometrical curves, have each one asymptote. And the branch or leg of a curve that has an asymptote, is said to be of the hyperbolic kind.

The nature of asymptotes will be easily conceived from the instance of the asymptote to the conchoid. Thus, if ABC, &c. be part of a conchoid, and the line MN be so drawn that the parts FB, GC, HD, IL, &c. of right lines, drawn from the pole P, be equal to each other, then will the line MN be the asymptote of the curve; because the perpendicular Cc is shorter than FB, and Dd than Cc, &c., so that the two lines continually approach, yet the points L e &c. can never coincide. Pl. 6.

ASYMPTOTES, by some, are distinguished into various orders. The asymptote is said to be of the first order, when it coincides with the base of the curvilinear figure; of the 2d order, when it is a right line parallel to the base; of the 3d order, when it is a right line oblique to the base; of the 4th order, when it is the common parabola, having its axis perpendicular to the base; and, in general, of the $n+2$ order, when it is a parabola whose ordinate is always as the n power of the base. The asymptote is oblique to the base, when the ratio of the first fluxion of the ordinate to the fluxion of the base approaches to an assignable ratio, as its limit; but it is parallel to the base, or coincides with it, when this limit is not assignable.

The areas bounded by curves and their asymptotes, though indefinitely extended, have sometimes limits to which they may approach indefinitely near; and this happens in hyperbolas of all kinds, except the first or Apollonian; and in the logarithmic curve, as was observed above. But in the common hyperbola, and many other curves, the asymptotical area has no such limit, but is infinitely great.— Solids, too, generated by hyperbolic areas, revolving about their asymptotes, have sometimes their limits, and sometimes they may be produced till they exceed any given solid.— Also the surface of such solid, when supposed to be infinitely produced, is either finite or infinite, according as the area of the generating figure is finite or infinite.

The way of discovering whether curves proposed have asymptotes, and the manner of drawing them when they are inclined to the axis, may be easily derived from the method of tangents, as in the following example. Let the curve be ADE (fig. 6. pl. 6.) with the equation $\frac{ay^{m+n}}{b} = x^m (a+x)^n$, the subtangent of which is found to be

$$TB = \frac{(m+n)(ax+xx)}{ma+(m+n)x}.$$

Then the intercepted line AT, $\frac{(m+n)(ax+xx)}{ma+(m+n)x} - x$, that is $= \frac{nax}{ma+(m+n)x}$. Now it is plain that the tangent TD will become an asymptote when, touching the curve at an infinite distance, that is, when the abscissa AB $= x$ becomes infinite, the intercepted line AT (then $=$ AM) shall remain finite. But, putting x infinite in the expression of AT, the first term ma of the denominator, is infinitely less than the other, and therefore vanishes. Whence, in this case, it will be $\frac{nax}{(m+n)x}$, or $\frac{na}{m+n}$, which is a finite quantity; so that the curve has an asymptote, which will pass through the point M, making AM $= \frac{na}{m+n}$. Now, to draw it, let AH be raised perpendicular to AB, and let the asymptote be for example MHP. This being supposed, if we take x infinite, it will be $x : y ::$ MA : AH; and on the supposition of x being infinite, the equation of the curve above given, a being then as nothing in respect of x, will be transformed into this, $\frac{ay^{m+n}}{b} = x^{m+n}$. Or, extracting the root, and for convenience, making $m+n=t$, it will be $y\sqrt[t]{a} = x\sqrt[t]{b}$, and, taking the fluxions $\dot{y}\sqrt[t]{a} = \dot{x}\sqrt[t]{b}$; so that, $\dot{x} : \dot{y} :: \sqrt[t]{a} : \sqrt[t]{b}$. Whence MA : AH $:: \sqrt[t]{a} : \sqrt[t]{b}$, and because MA $= \frac{na}{t}$, we shall have $\frac{na}{t}$: AH $:: \sqrt[t]{a} : \sqrt[t]{b}$, or AH $= \frac{na}{t}\sqrt[t]{\frac{b}{a}}$. If, therefore, we take AM $= \frac{na}{t}$, and raise the perpendicular AH $= \frac{na}{t}\sqrt[t]{\frac{b}{a}}$, the indefinite right line MHP drawn through the points M and H will be the asymptote of the curve ADL.

If m and n be each $=1$, the curve becomes the Apollonian hyperbola whose equation is $\frac{a}{b}y^2 = (a+x)x$; then will $t=2$, and therefore AM $= \frac{1}{2}a$, and AH $= \frac{1}{2}a \times \sqrt{\frac{b}{a}} = \frac{1}{2}\sqrt{ab}$. That is, AM is half the transverse axis, and AH half the conjugate; results corresponding with what are shewn in treatises of conic sections.

Again, suppose ADF in the same figure to be a curve whose equation is $y^3 - x^3 = axy$, making AB $= x$, BD $= y$. By taking the fluxions we shall have $3y^2\dot{y} - 3x^2\dot{x} = a\dot{x}y + ay\dot{x}$, and therefore $\frac{y\dot{x}}{\dot{y}} = \frac{3y^3 - axy}{3x^2 + ay}$, and

$$AT = \frac{y\dot{x}}{\dot{y}} - x = \frac{3y^3 - 3x^3 - 2axy}{3x^2 + ay}.$$

Or, instead of $3y^3 - 3x^3$, putting its value $3axy$ from the equation of the curve, it will be AT $= \frac{axy}{3x^2+ay}$. Then, making x infinite, to

suit the case of an asymptote, in which AT becomes AM, the term ay is nothing in respect of $3x^2$, so that we shall have AM $= \frac{axy}{3x^2} = \frac{ay}{3x}$ But, because in the proposed equation the indeterminates cannot be separated, nor consequently the value of AM determined, if we put AM $= \frac{ay}{3x} = s$ (an expedient which may be adopted in other such cases) we shall have $y = \frac{3sx}{a}$, and this value substituted for y in the proposed equation, $3sx^2$ or $\frac{27s^3x}{a^3} - a =$ But, since x is infinite, the last term will be as nothing with regard to the others, so that it will be $\frac{27s^3x}{a^3} - a = 0$, whence $s = \frac{1}{3}a$ Taking therefore AM $= \frac{1}{3}a$, the asymptote must be drawn through the point M Moreover, it must be MA : AH :: x : y, and the proposed equation will be reduced to $x^3 = y^3$, or $x = y$, when x is infinite, and therefore $x = y$ Consequently, making MA $=$ AH, the right line drawn through M and H will be the asymptote sought

For examples of the method of drawing asymptotes when the coordinates are not rectangular, see Agnesi's Institutions, book ii Maclaurin's Fluxions, book i ch 10 Cramer's Introduc Analyse des lignes courbes, art 147, &c

ASYNDETON, in grammar a figure which omits the conjunctions in a sentence as in *veni, vidi, vici* where *et* is left out or in that of Cicero concerning Catiline, abiit, excessit, evasit, erupit

AT *prep* (æt, Saxon) 1 *At*, before a place, notes the nearness of the place as a man is *at* the house before he is *in* it (*Stil*) 2 *At*, before a word signifying time, notes the coexistence of the time with the event he rose *at* ten (*Swift*) 3 *At*, before a causal word, signifies nearly the same as *with* he did it *at* a touch (*Dryden*) 4 *At*, before a superlative adjective, implies *in the state* as, *at best*, in the state of most perfection, &c (*South*) 5 *At* signifies the particular condition of the person as, *at* peace (*Swift*) 6 *At* sometimes marks employment or attention busy *at* his task (*Pope*) 7 *At* is sometimes the same with *furnished with* as a man *at* arms (*Shakspeare*) 8 *At* sometimes notes the place where any thing or body is, he lives *at* Barnet (*Pope*) 9 *At* sometimes signifies an immediate consequence of he swooned *at* the sight (*Hale*) 10 *At* marks sometimes the effect proceeding from an act he eats *at* his own cost (*Dryden*) 11 *At* sometimes is nearly the same as *in*, noting situation he was *at* the top (*Swift*) 12 *At* sometimes marks the occasion, like *on* he comes *at* call (*Dryden*) 13 *At* sometimes seems to signify *in the power of*, or *obedient to* (*Dryden*) 14 *At* sometimes notes the relation of a man to an action (*Collier*) 15 *At* sometimes imports the manner of an action (*Dryden*) 16 *At* means sometimes *application to*, or *dependence on* (*Pope*) 17 *At all* In any manner (*Pope*)

ATABAL *s* A kind of tabour used by the Moors (*Dryden*)

ATAIR, in astronomy See ALCAIR

ATALANTA, in fabulous history, a daughter of Schœneus, king of Scyros Ancient fabulists have differed much in their accounts of her According to Ovid she was born in Arcadia, and she determined to live in perpetual celibacy, but her beauty gained her many admirers, and to free herself from their importunities she proposed to run a race with them They were to run without arms, and she was to carry a dart in her hand Her lovers were to start first, and whoever arrived at the goal before her would be made her husband, but all those whom she overtook were to be killed by the dart with which she had armed herself As she was almost invincible in running, many of her suitors perished in the attempt till Hippomenes proposed himself as her admirer Venus had presented him with three golden apples from the garden of the Hesperides, and as soon as he had started in the course, he artfully threw down the apples at some distance one from the other While Atalanta, charmed at the sight stopped to gather the apples, Hippomenes hastened on his course, arrived first at the goal, and obtained Atalanta in marriage These two fond lovers, in the impatience of consummating their nuptials, entered the temple of Cybele, and the goddess was so offended at the profanation of her house, that she changed them into two lions

ATAMASCO LILY See AMARYLLIS

ATARAXIA A'TARAXY *s* (Exemption from vexation, tranquillity (*Glanville*)

ATARNEA, an ancient town of Mysia, situated between Adramyttium and Pitane remarkable for the marriage of Aristotle with the sister or concubine of the tyrant Hermias, also for the dotage of that philosopher

ATAXIA, (*ataxia*, ἀταξία, from α, neg and τασσω, *to order*) Want of regularity in the symptoms of a disease, or of the functions of an animal body

ATCHE, in commerce, a small silver coin current in the states of the Grand Seignor, equivalent to about a third part of the English penny

ATCHIEVEMENT, or ACHIEVEMENT, in heraldry, denotes the arms of a person or family, together with all the exterior ornaments of the shield, as helmet, mantle, crest, scrolls, and motto, together with such quarterings as may have been acquired by alliances, all marshalled in regular order

ATE The preterit of *eat*

ATE, a termination adopted by the authors of the new chemical nomenclature, to express an extensive class of neutral salts which are

formed by the union of acids perfectly saturated with oxygen, with earthly, alkaline, or metallic bases When the acids have an excess of base, i e are not completely saturated with oxygen, the salts formed by their combination with the preceding bases, are denoted by the termination ite Thus the salts composed of nitric acid and a base, are termed nitrates, while those resulting from nitrous acid and similar bases, are called nitrites See ITE and NOMENCLATURE

ATE, in heathen mythology, a goddess, who perverted men s understanding, clouded their reason, and delighted herself in involving them in misfortunes and engaging them in quarrels There was no way to be secured from her, but by having recourse to the Lites This goddess was daughter of Jupiter, and cast down from heaven at the birth of Hercules For Juno having deceived Jupiter, in causing Euristheus to be born before Hercules, Jupiter expressed his resentment on Ate, as the author of that mischief, and threw her headlong from heaven to earth, swearing she should never return thither again (Homeri Il xix 125) The name of this goddess comes from ἀτάω, noceo, *to hurt* Her being the daughter of Jupiter means, according to mythologists, that no evil happens to us but by the permission of providence, and her banishment to earth denotes the terrible effects of divine justice among men

ATLGAR, a kind of hand-dart used by the Saxons

ATELLANÆ, in antiquity, a kind of comic and satiric pieces, presented on the Roman theatre They had their name from Atella, a city of Tuscany where they were first represented

A TEMPO GIUSTO, in music, directs to sing or play in an equal, true, and just time

ATH, among the Saxons, a purifying oath

ATHAMADULET, the prime minister of the Persian empire, as the grand vizier is of the Turkish empire He is great chancellor of the kingdom, and president of the council

* ATHAMANTA Spignel stone-parsley a genus of the class and order pentandria, digynia Fruit ovate, oblong, convex, striate, petals nearly uniform, inflected so as to seem notched, calyx entire Eleven species, European plants

ATHAMANTA CRETENSIS The systematic name for the daucus creticus of the pharmacopœias See DAUCUS CRETICUS

ATHAMANTA OREOSELINUM The systematic name for the officinal oreoselinum See OREOSELINUM

ATHANASIA In botany, a genus of the class and order syngenesia, polygamia æqualis Receptacle chaffy, seeds crowned with very short bristly chaff, calyx imbricate Twenty-one species, all of the Cape

ATHANASIAN CREED See CREED

ATHANASIUS (St), was born in Alexandria He distinguished himself so much at the council of Nice, that on the death of Alexander, bishop of Alexandria, he was chosen to succeed him in 326, when he was about 28 years of age He had been greatly persecuted by the Arians before his consecration, and now their rage against him was redoubled, particularly as he refused to admit their leader into the church, though he was commanded to do so by Constantine

In 335 he was deposed by the council of Tyre when, having recourse to the emperor Constantine, the Arian deputies accused him of having hindered the exportation of corn from Alexandria to Constantinople, on which the emperor, without suffering him to make his defence, banished him to Treves The emperor, two years after, gave orders that he should be restored to his bishopric But, on his return to Alexandria, his enemies brought fresh accusations against him, and chose Gregory of Cappadocia to his see, which obliged Athanasius to go to Rome to reclaim it of pope Julius He was there declared innocent, in a council held in 342, and in that of Sardica in 347, and two years after was restored to his see by order of the emperor Constans but after the death of that prince, he was again banished by the emperor Constantius, which obliged him to retire into the deserts The Arians then elected one George in his room, who being killed in a popular sedition under Julian, in 360, St Athanasius returned to Alexandria, but was again banished under Julian, and restored to his see under Jovian He addressed to that emperor a letter, in which he proposed that the Nicene creed should be the standard of the orthodox faith, and condemned those who denied the divinity of the Holy Ghost He was also banished by Valens in 367, and afterwards recalled St Athanasius died on the 2d of May, 373

His works principally contain a defence of the mystery of the Trinity, and of the incarnation and divinity of the Word and Holy Spirit There are three editions of his works which are esteemed, that of Commelin, printed in 1600, that of Peter Nannius, in 1627, and that of father Montfaucon, in 3 vols fol 1698 The creed which goes by his name is supposed to have been compiled by an African bishop, in the 5th century

The historian Gibbon speaks much at large on the talents, learning and character of Athanasius, concluding by saying "It was not only in ecclesiastical assemblies, among men whose education and manners were similar to his own, that Athanasius displayed the ascendency of his genius he appeared with easy and respectful firmness in the courts of princes, and on the various turns of his prosperous and adverse fortune, he never lost the confidence of his friends, or the esteem of his enemies "

ATHANATA, (from the privative α and θάνατος *death*,) immortals, an order of soldiers among the ancient Persians.

ATHANOR, a kind of furnace used by the ancient chemists, for the purpose of keeping up a long continued heat, without the necessity of constant attendance The heat is preserved by a supply of charcoal which, being put in at

the top or tower of the athanor, falls down by degrees, as the fire in the grate underneath is consumed. This apparatus was particularly used by the alchemists in their researches after the art of making gold, the universal medicine, &c. Since their time, it has fallen into disuse, though there are particular operations and experiments in chemistry in which it might probably be employed with advantage.

ATHAPESCOW, a lake of North America, 100 miles long, and from ten to thirty wide. Lon. 110 W. Greenwich. Lat. 59 N.

ATHBAY, a town of Ireland, in the county of Meath, a borough which returned two members to the Irish parliament: twenty-nine miles N. W. Dublin.

A'THEISM. *s.* (from *atheist.*) The disbelief of a God.

The learned and eloquent Dr. Parr, in the notes to his celebrated Spital Sermon, has very ably stated the different operations of atheism and superstition. It is not his intention to plead either directly or indirectly the cause of superstition, to palliate its absurdities, or to varnish over its crimes, but to contrast the effects of two acknowledged evils, and to shew that from atheism naturally result consequences more direful than from superstition. The passage, though very interesting, is too long to be inserted here. It may be seen in the notes to the Spital Sermon, p. 97, 99.

A'THEIST. *s.* (from the privative *α* and Θεος, *God.*) A person who does not believe the existence of a deity, or a providence.

Atheists are speculative and practical. A reasonable creature who disbelieves the being of a God, or thinks it inconsistent with sound reason to believe that the great first cause is perfect in holiness, power, wisdom, justice, and beneficence, is a speculative atheist, and he who endeavours to instil the same unbelief into others, is a practical atheist.

A very admirable writer of much taste and genius has recently sketched the progress by which atheists ascend the dreary eminence where they "look with so much complacency up to a vacant heaven, and down to the gulf of annihilation." In the course of his enquiry he has suggested an argument which being at the same time original, popular, and convincing, shall be given in this place.

Surely, says this able author, the creature that lifts his voice and defies all invisible power within the possibilities of infinity, challenging whatever unknown being may hear him, and may appropriate that title of almighty which is pronounced in scorn, to evince his existence, if he will, by his vengeance, was not as yesterday a little child, that would tremble and cry at the approach of an insignificant reptile.

But, indeed, it is heroism no longer, if he knows that there is no God. The amazement then turns on that great process by which a man could grow to the piercing and immense intelligence that can know, or without matchless presumption assume, that there is no God. What ages, and what lights, are requisite for this attainment! This intelligence involves the very attributes of divinity, while a God is denied. For unless this man is omnipresent, unless he is, at this moment, in every place in the universe, he cannot know but there may be in some place manifestations of a deity by which even he would be overpowered. If he does not know absolutely every agent in the universe, the one that he does not know may be God. If he is not himself the chief agent in the universe, and does not know what is so, that which is so may be God. If he is not in absolute possession of all the propositions that constitute universal truth, the one which he wants may be, that there is a God. If he cannot with certainty assign the cause of all that exists, that cause may be God. If he does not know every thing that has been done in the immeasurable ages that are past, some things may have been done by a God. Thus, unless he knows all things, that is, precludes another Deity, by being one himself, he cannot know that the being whose existence he rejects, does not exist. But he must know that he does not exist, else he deserves ineffable contempt for the madness with which he firmly avows his rejection, and acts accordingly. See Foster's Essays, vol. I. Essay 1. passim.

Cicero represents it as a probable opinion, that they who apply themselves to the study of philosophy believe there are no gods. This must, doubtless, be meant of the academic philosophy, to which Cicero himself was attached, and which doubted of every thing. On the contrary, the Newtonian philosophers are continually recurring to a Deity, whom they always find at the end of their chain of natural causes. Some foreigners have even charged them with making too much use of the notion of a God in philosophy, contrary to the rule of Horace: Nec Deus intersit, nisi dignus vindice nodus. Among us, the philosophers have been the principal advocates for the existence of a Deity. Witness the writings of sir Isaac Newton, Boyle, Ray, Cheyne, Nieuwentyt, Euler, Hartley, Robison, &c. To which may be added many others, who, though of the clergy (as was also Ray), yet have distinguished themselves by their philosophical piece in behalf of the existence of a God, *e. gr.* Derham, Bentley, Whiston, Samuel and John Clark, Fenelon, Paley, &c. So true is that saying of lord Bacon, that though a smattering of philosophy may lead a man into atheism, a deep draught will certainly bring him back again to the belief of a God and Providence.

A'THEIST. *a.* Atheistical, denying God. (*Milton.*)

ATHEI'STICAL. ATHEI'STICK. *a.* (from *atheist.*) Given to atheism, impious. (*South. Ray.*)

ATHEI'STICALLY. *ad.* (from *atheistical.*) In an atheistical manner. (*South.*)

ATHEISTICALNESS. *s.* (from *atheistical.*) The quality of being atheistical. (*Ham.*)

A'THEOUS. *a.* (ἄθεος.) Atheistick, godless. (*Milton.*)

ATHELING, ADELING, EDLING, ETHLING, or ETHELING, among the Anglo-

Saxons, was a title of honour, properly belonging to the heir apparent, or presumptive, to the crown

ATHELNEY, a river island of Somersetshire, at the confluence of the Thone and Parret, memorable for having afforded shelter, amid its inaccessible morasses, to the illustrious king Alfred. Here he collected some of his retainers, on which account, he called it Æthelingay, or the isle of Nobles, and hence he made frequent and unexpected sallies upon the Danes

ATHELSTAN, or ÆTHESTAN, (son of Edward surnamed the Elder, king of the West Saxons, and of Edgina, a shepherd's daughter,) succeeded his father in 924, he defeated Anlaff, king of Northumberland, whose army consisted of Scots, Picts, Danes, and Norwegians, and obtained such reputation, that the emperor Henry, surnamed the Fowler, sent to demand one of his sisters in marriage for his son Otho, Hugo, king of the Franks, also desired another for his son, and Lewis, prince of Aquitain, sent an ambassy to desire a third for himself. He was equally successful against the Welsh, for having beaten them in the field, he caused Ludwal, king of Wales, with his petty princes, to meet him at Hereford, where they did him homage, and promised to pay him a yearly tribute. The greatest blemish in the reign of Athelstan is supposed to be his treatment of his brother Edwin, whom he suspected of having a design to deprive him of his crown, for it is certain, he caused him to be put on board a leaky ship, with his armour-bearer and page, when the young prince, unable to bear the severity of the weather and want of food, drowned himself. Athelstan, however formed many wise laws, and rendered himself much admired on account of his wisdom, wealth, and the extent of his dominions. He reigned about sixteen years, and died at Gloucester, in 942

ATHEMENES, in fabulous history, son of Catreus, king of Crete, who was informed by an oracle that he should kill his father, he therefore left him, and retired to Rhodes, where he built the temple of Atamyrius, upon a mountain of the same name, when his father coming thither in search of him, he killed him without knowing him

ATHENÆA, in botany, a genus of the class and order octandria monogynia. Calyx coloured, five parted, corol none, bristles eight, feathered between the filaments, stigma five-parted, capsule globose, one-celled, three-valved, seeds three to five. There is one species, a branching shrub of Guinea, the bark, leaves, and fruit, are sharp and aromatic, called caffé diable by the Creoles

ATHENÆA, a feast celebrated by the ancient Greeks in honour of Minerva

ATHENÆUM, in antiquity, a public place where the professors of the liberal arts held their assemblies, the rhetoricians declaimed, and the poets rehearsed their performances. The three most celebrated athenæa were those at Athens, at Rome, and at Lyons, the second of which was built by the emperor Adrian

ATHENÆUS, a physician, born in Cilicia, contemporary with Pliny, and founder of the pneumatic sect. He taught that the fire, air, water, and earth, are not the true elements, but that their qualities are, viz. heat, cold, moisture, and dryness, and to these he added a fifth element, which he called spirit, whence his sect had its name

ATHENÆUS, a Greek grammarian, born at Naucratis in Egypt, in the 3d century, one of the most learned men of his time. Of all his works we have none extant but his Deipnosophis, i. e. the Sophists at Table, there is an infinity of facts and quotations in this work which render it very agreeable to admirers of antiquity

The best editions of this author are those of Isaac Casaubon, in 1597 and 1612-57, and of Schweighæuser, in 1801. An interesting account of the materials from which Schweighæuser compiled his edition, is given in the Monthly Magazine for January, 1803

There was also a mathematician of this name, who wrote a treatise on mechanics, which is inserted in the works of the ancient mathematicians, printed at Paris in 1693, in folio, in Greek and Latin

ATHENAGORAS, an Athenian philosopher, flourished about the middle of the 2d century, and was remarkable for his zeal for Christianity, and his great learning, as appears from the Apology which he addressed to the emperors Marcus Aurelius Antoninus and Lucius Commodus

ATHENODORUS, a famous stoic philosopher, born at Tarsus, went to the court of Augustus, and was made by him tutor to Tiberius. Augustus had a great esteem for him, and found him by experience a man of virtue and probity. He used to speak very freely to the emperor. He, before he left the court to return home, warned the emperor not to give himself up to anger, but, whenever he should be in a passion, to rehearse the 24 letters of the alphabet before he resolved to say or do any thing. He did not live to see his bad success in the education of Tiberius

ATHENOPOLIS, a town of the Massiliensis, an ancient nation of Gaul. It is conjectured by Harduin to be the same with Telo Martius, now Toulon, by others, to be the same with Antipolis or Antibes

ATHENS, in ancient geography, the most famous city of Greece, situated in that part of Achaia, which lies upon the coast, from whence it was called Acte, and afterwards Attica. The first founder of it is said to be Cecrops in the time of Moses, whence it was called Cecropia or Ionia, from Ion the son of Xuthus, and afterwards Athens from Minerva, Ἀθήνη, in Greek, signifying Minerva. This city was famous for learning and eloquence, and the defence of all Greece, says Lucian in his Praise of Demosthenes. "I might," adds he, "speak of the Gods, to whom it owes its beginning,

their amours, decrees, dwellings, presence and mysteries I might speak of its laws, decrees, assemblies, colonies, victories and trophies, which are so great and many, as well by sea as by land, that he must be more eloquent than Demosthenes, who can sufficiently describe them "

It was governed by kings, for the space of 460 years, of whom the first was Cecrops; but their power degenerating into tyranny, the people shook off the regal yoke, which ended in Codrus They were governed for a long time after by 500 magistrates, named prytanes, who ruled by turns, 50 at a time, and after by nine magistrates, of whom the chief was called Archon This government did not continue above 460 years, and their commonwealth or somewhat like it being often interrupted by tyrants, who assumed an absolute authority

Varro gives this account of the original of the word Athens "An olive tree," says he, "growing up out of the earth on a sudden in a certain place, and a spring of water rising in another, these prodigies astonished the king, who sent to Apollo at Delphos to know the signification of them, and what he should do The oracle answered that the olive tree signified Minerva, and the water Neptune, and it belonged to them to see from which of those two Gods they would name their city

"Hereupon Cecrops assembled all his citizens, as well men as women (for the women at that time had a voice in their councils) When they came to vote, all the men were for Neptune, and all the women for Minerva and because there was one woman more, Minerva carried it, and the city was named Athens, which is taken from that of Minerva, whom the Greeks call Ἀθηνᾶ Neptune being incensed at it depopulated the country of the Athenians with his waves, and to appease him, says the same author, the women suffered three sore punishments First, that from that time they should never have a voice in their councils, the second that none of their children should bear their name, and lastly, that they should not be called Athenians but Attícks "

The old city, or citadel, was sixty stadia, or about 2¼ leagues in circuit, it was fenced with wooden pales, and, as some say, set about with olive trees, besides being fortified with a strong wall The inside of the citadel was adorned with innumerable edifices, statues and monuments The lower city comprehended all the buildings that surrounded the citadel, together with the harbours of Phalerum, Munichiæ, and the Piræus The whole circuit of the city, in its most flourishing state, was not less than about 22 Roman miles

Ancient Athens, however, though containing many noble buildings, was by no means so magnificent in its general appearance as many moderns are inclined to suppose On entering the city, says Dicearchus the disciple of Aristotle (in his fragment entitled ΒΙΟΣ ΈΛΛΑΔΟΣ) no person would imagine himself at Athens the streets, he adds, are strikingly irregular, the town in general badly provided with water, and, although some houses appear more convenient than others, yet all of them are wretched It is only when arrived at the theatre, continues he, and on discovering the grand temple of Minerva, that the incertitude begins to vanish, which was produced by the excessive disproportion between the real state of things, and the splendour of their reputation

An inherent defect in the construction of houses in Athens occasioned great inconvenience the stairs were erected in the street and the upper apartments, projecting over the , disfigured the façades, obstructed the view and prevented a free circulation of air All this arose from the avarice of the proprietors, who, by placing galleries over the heads of the passengers, endeavoured as much as possible to gain possession of the very streets (Aristotle Œconomica, lib II Polyænus Strat lib III) Amongst us, says Euripides it is a general rule with architects never to adorn the roofs of houses, nor to render them at all remarkable (*Hippolyt*) An edifice too highly decorated or distinguished by a little more than common elevation, must instantly have attracted a crowd of jealous observers, and suggestions would not have been wanting that this elevation denoted a pride incompatible with republican equality Another circumstance tended still farther to the deformity of Athens many spots according to Xenophon, remained vacant, where the habitations had either been destroyed by fire, or erased by a decree of the people (Treat on Finances) No sooner was a citizen accused of high treason, or some such crime, than immediately his house was demolished, as a vessel is broken which has contained poisonous liquor Neither was it lawful to rebuild there, for the very ground was supposed to become fatal and execrable, from the crime of its former possessors

As to the real extent of Athens, it is certain that the ramparts sixty stadia in circumference far exceeded what would have been necessary had the nation in time of war possessed any other place of refuge On such distressing occasions, inhabitants from the country, who had no dwellings, constructed in the openest places a number of huts, resembling in figure the hives of bees Aristophanes who had seen these miserable sheds during the Peloponnesian war, compares them (comedy of the Knights) to those earthen urns called casks, which were in use among the Greeks Exclusive of such dwellings, erected for the moment, all the houses in Athens did not, as Xenophon positively attests (Fact Socrat lib III) exceed ten thousand, and thus the total number of inhabitants may be set down at about fifty thousand, including both slaves and strangers

The excess of magnificence displayed in the temples and public edifices rendered the wretchedness of the private buildings more conspicuous The eye was carried rapidly from one

extreme to the other, without finding any thing intermediate on which to repose, and this evil, instead of diminishing, became constantly more prevalent As no connexion or proportion subsisted among the parts, it was impossible that the whole could produce any beautiful effect The three thousand statues erected in the public places, and under the porticos of Athens, did not conceal the deformity of the streets, because a profusion of ornaments can never compensate for misery The passion for porticos and colonnades was very great, but their effect must have been considerably diminished by the shade of so many trees planted by the Greeks quite in the centre of their towns From this desire of preserving at least the image of a country life, Athens was encumbered with plane trees, and the shade of the olive concealed the monuments of Megara from the view of travellers From this sketch the reader may easily judge, that Athens, however celebrated for learning, sciences, and arts, for the finest specimens of sculpture, and the utmost magnificence of architecture, by no means deserved the character which some moderns have given it, of being unequalled in beauty

The modern city is called Setines and is now the see of a Greek archbishop with several churches, but inconsiderable if compared with its ancient splendour it contains about fifteen or sixteen thousand inhabitants, chiefly Greeks It was taken by Mahomet II, in the year 1455 the Venetians took it from the Turks in 1464 and 1687, but were compelled to abandon it, and the Turks are now masters of it with the rest of the country the chief articles of trade are silks wax, wool, and oil It is a seaport, and situated on the north east coast of the gulf of Engia, in the Archipelago, with a safe and large harbour, the entrance, which is narrow, is commanded by the citadel, the ancient Acropolis sixty miles SE Livadia, and 304 SW Constantinople Lat 38, 5 N Lon 23 57 E

ATHENIANS, the people who inhabited the capital of ancient Attica called Athens

The Athenians, says Elian, wore purple garments, having their hair tied with ribbons of gold and silver, adorned with golden grasshoppers

Thucydides in the beginning of his history, calls the Athenians, τεττιγοφόροι, that is to say, *wearers of grasshoppers*, and the reason he gives for it is this He says it was to distinguish free-men from slaves Lucian tells us the same thing Tretzes teaches us that the grasshoppers which the Athenians wore were to shew, that they were great speakers, and very prolix in their discourse

Those who wish to know more concerning Athens and the Athenians, may consult Stewart's Athens, Spon Voyage en Grece, tom ii, Chandler's Travels into Greece, Wheler's do., Gibbon's Hist vol xi, De Pauw's Dissertations on the Greeks, and Gillies's Greece

ATHERDEE See ARDEE

ATHERINA (*atherine*) In zoology, a genus of the class pisces, order abdominalia Upper jaw a little flat, gill membrane, six-rayed, sides with a silvery stripe Five species in the different seas of the globe (See Nat Hist pl XXIV) Of these one only one worthy of notice is the a menidia, silver fish, so often introduced into our marble basons, and globular glasses for ornament It is an inhabitant of the fresh waters of Carolina body small, pellucid, scales spotted with black teeth numerous on the lips, but none in the jaws or tongue lateral line silvery tail forked

ATHEROMA, (*atheroma*, n ἀθήρωμα, *pulse, pap.*) An encysted tumour that contains a soft substance of the consistence of a poultice

ATHEROMATOUS a (from *atheroma*) Having the qualities of an atheroma, or curdy wen (*Wiseman*)

ATHERSTON, a town of Warwickshire, having a market on Tuesdays Lat 52 40 N Lon 1 30 W

ATHINI, or SETINES, modern Athens

ATHIRST ad (from *a* and *thirst*) Thirsty, in want of drink (*Dryden*)

ATHLETÆ, wrestlers, or combatants, courageous and strong men, who addicted themselves to bodily exercises, as running, fighting, and others of like natures, among the Greeks and Romans, and for whom the ancients appointed prizes

These athletæ were in great esteem among the Greeks, but were infamous at Rome, for some time Ulpian the lawyer freed them from the marks of infamy

This is the way by which they were matched in the plays of the Circus "They took an earthen pot into which they put certain balls about the bigness of a bean, on which was set an A, or a B, or some other letter, and always two letters alike Then the champions came forth one after another, and made their prayer to Jupiter before they drew, and then put their hands into the pot, but the herald of the plays stretching out his rod hindered them from reading their tickets till they were all drawn Presently one of the judges, or some other person took every one's ball, and joined them together who had the same letters, if the number of the athletæ were odd, he that had the single letter was to fight with the conqueror, which was no small advantage, because he came fresh to the combat with him who was weary Their food was barley bread, which was the reason they were called *hordearii*, i e barley eaters, and also another sort of bread, called *coliphia*, of κῶλα, *membra*, and ἶφια, *robusta*, because it made their bodies strong and robust Some fed them with soft cheese, and Dromeus was the first who fed them with meat, according to the testimony of Pausanias in his Eliaca

Montesquieu and various other moderns have ascribed many fancied advantages to the exercises of the athletæ, but we should cautiously avoid laying much stress upon their opinion, when it is recollected that it is in direct opposition to that of all the ancient physicians These athletæ augmented the force of

particular members, to the detriment of the whole, and thus produced some peculiar deformity, and destroyed the proper equilibrium of the bodily powers Thus, the wrestlers and boxers became of a prodigious size from their loins upwards, while their legs and thighs were remarkably slender; and with the discoboles, the carnosity of the arms became monstrous, and the neck nearly inflexible Therefore, Galen attests in the most positive manner, that no physician since the time of Hippocrates ever approved of the frame, constitution, or regimen of the athletæ, And Solon taught the Athenians that it was infinitely more advantageous to employ the money of the state in providing for orphans, than in nourishing a race of men who were equally useless in peace and war For the athletæ, as Euripides declares, were the worst soldiers in Greece

ATHLETICK *a* (from *athleta*, Latin) 1 Belonging to wrestling 2 Strong of body; vigorous, lusty, robust (*Dryden*)

ATHLONE, a town of Westmeath, in Ireland Lat 53 22 N Lon 7 41 W

ATHLOTHETA, in antiquity, an officer who superintended the public games

ATHNACH, the name of one of the principal of the Hebrew accents, which serves not only to regulate the voice, but to distinguish the numbers of a sentence, whence its name athnach, i e respiratio

ATHOL, a subdivision of Perthshire, in Scotland, containing some fine lakes

ATHOS mount Athos, situate between Macedonia and Thrace Xerxes cut a way through it to make a passage for his army, when he went into Greece Lucian relates that the architect Dinocrates, who was in the army of Alexander, offered him to cut mount Athos into the shape of a man, who should hold in his left hand a great city, and in his right hand a cistern which should receive the waters of all the rivers which fell from that mountain, and to convey them into the sea

Alexander commended his curious design, but did not allow of the place, because there were no fields about the city to furnish the inhabitants with corn for their subsistance Athos is situated in lat 40 10 N lon 24 45 E

ATHWART, in navigation, is synonymous with across the line of the course Athwart the fore foot, is a phrase that denotes the flight of a cannon-ball from one ship across the course of another, to intercept the latter, and oblige her to shorten sail, that the former may come near enough to examine her Athwart-hause, expresses the situation of a ship, when she is driven by wind or tide, or any other accident, across the fore part of another Athwart-ships, reaching across ships from one side to the other

ATHWA'RT *ad* 1 In a manner vexatious and perplexing (*Shakspeare*) 2 Wrong (*Shakspeare*)

ATILT *ad* (from *a* and *tilt*) 1 In the manner of a tilter, with the action of a man making a thrust (*Hudibras*) 2 In the posture of a barrel raised or tilted behind, to make it run out (*Spectator*)

ATLANTIC OCEAN, takes its name from mount Atlas, in Africa, and lies between the continents of Africa and Europe, and the continent of America Its least breadth, from Guinea, in Africa, to Brasil in S America, is 2300 miles

ATLANTIADES, a patronymic of Mercury, as grandson of Atlas *Ovid*

ATLANTIDES, a people of Africa, near mount Atlas The daughters of Atlas, seven in number, Maia, Electra, Taygeta, Asterope, Merope, Alcyone, and Celæno They married some of the gods and most illustrious heroes, and their children were founders of many nations and cities The Atlantides were called nymphs, and even goddesses on account of their great intelligence and knowledge The name of Hesperides was also given them, on account of their mother Hesperis They were made constellations after death See PLEIADES

ATLANTIS, in antiquity, an island spoken of by Plato and many other writers under some extraordinary circumstances, and rendered famous by a controversy among the moderns, concerning its place and existence The most distinct account of this country is given in Plato's Timæus and Critias

ATLANTIS (New), is the name of a fictitious philosophical commonwealth, of which a description has been given by lord Bacon Its chief design is to exhibit a model of a college, instituted for the interpretation of nature and the production of great and marvellous works, for the benefit of men under the name of Solomon's House, or, "the college of the six days work Thus much, at least is finished and with great beauty and magnificence The author proposed also a frame of laws, or of the best state or mould of a commonwealth But this part is not executed

ATLAS, in fabulous history, one of the Titans, son of Japetus and Clymene He was brother to Epimethus, Prometheus and Menœtius He married Pleione, daughter of Oceanus, or Hesperis, according to others, by whom he had seven daughters, called Atlantides (see ATLANTIDES) He was king of Mauritania, and master of a thousand flocks of every kind, as also of beautiful gardens, abounding in every species of fruit, which he had entrusted to the care of a dragon Perseus, after the conquest of the Gorgons, passed by the palace of Atlas, and demanded hospitality The king, who was informed by an oracle of Themis that he should be dethroned by one of the descendants of Jupiter, refused to receive him, and even offered him violence Perseus, who was unequal in strength, shewed him Medusa's head, and Atlas was instantly changed into a large mountain, which runs across the deserts of Africa east to west, and is so high that the ancients imagined that the heavens rested on its top, and that Atlas supported the world on his shoulders The fable that Atlas supported the heavens on his back, arises from his fondness for astronomy, and his often frequenting

elevated places and mountains, whence he might observe the heavenly bodies

Atlas (Great and Little), mountains of Africa the Great Atlas extends from the desert of Barca, about eighty leagues west of Alexandria to the coast of the Atlantic sea, to which it gives name, but often changes its name, according to the multitude of countries it runs through, and the plains and valleys by which it is intersected, it is called by the natives Ayduaçal The Little Atlas extends from the Straits of Gibraltar to Bona in the country of Algiers, and is called by the natives Erriff Both these are of such vast height, and for the most part covered with snow, as to be seen at a great distance off at sea The highest parts and most difficult of access are those which run along the confines of the kingdom of Tremecen, and the coldest those that bound the dominions of Morocco

Atlas, also denotes a book of universal geography, containing maps of the known parts of the world

A'tlas (*Atlas*, ατλα, from ατλαω, *to sustain*, because it sustains the head, or from the fable of Atlas, who was supposed to support the world upon his shoulders.) The name of the first cervical vertebra This vertebra differs very much from the others (see Vertebræ) It has no spinous process which would prevent the neck from being bent backwards, but in its place it has a small eminence The great foramen of this is much larger than that of any other vertebra Its body which is small and thin, is nevertheless firm and hard It is somewhat like a ring, and is distinguished into its great arch, which serves in the place of its body, and its small posterior arch The atlas is joined superiorly to the head by ginglymus, and inferiorly to the second cervical vertebra by means of the inferior oblique processes, and the odontoid process by trochoides

Atlas, in commerce, a silk-satin, manufactured in the East Indies, There are some plain, some striped, and some flowered, the flowers of which are either gold or only silk The manufacture of them is admirable, the gold and silk being worked together after such a manner as no workmen in Europe can imitate, yet they are very far from having that fine gloss and lustre which the French know how to give to their silk stuffs

ATMOSPHERE (*atmosphera*, from ατμος, *vapour*, and σφαιρα, *a sphere*) The gaseous or aeriform fluid which everywhere invests the surface of the terraqueous globe, and probably that of the other planets

The same word also denotes the sphere of the aroma of a plant, or of the infection of a contagious body

The terrestrial atmosphere imports the whole of the fluid mass, consisting of air, aqueous and other vapours, electric fluids, &c which surrounds the earth to a considerable height, and partakes of all its motions, both annual and diurnal

The atmosphere is a vast laboratory in which nature continually performs numberless processes of analysis, solution, precipitation, and combination It is an immense recipient, in which all the attenuated and volatilized productions of terrestrial bodies are received, agitated, mingled, combined, or separated Considered in this view, the atmospheric air is a chaos, an indeterminate mixture of mineral vapours, vegetable and animal molecules, seeds, and eggs, through which the luminous, the calorific, and the electric fluids incessantly pass and repass in all directions

There is one substance, namely, the electrical fluid, which is very distinguishable in the mass of the atmosphere To measure the absolute quantity of this fluid, either in the atmosphere or any other substance, is perhaps impossible and nearly all that we know on this subject is, that the electric fluid pervades the atmosphere, that it appears to be more abundant in the superior than the inferior regions, that it seems to be the immediate bond of connection between the atmosphere and the water which is suspended in it, and that by its various operations, the phenomena of hail, rain, snow, lightning, and the other kinds of meteors are chiefly occasioned On this subject we would refer the inquisitive reader to a paper by Mr Erman, entitled Observations and Doubts concerning atmospheric Electricity, in Nos 40 and 41 of Nicholson's Journal, N S

Composition and Chemical Properties It has been already observed under the article Air, that the atmosphere contains, beside azotic and oxygen gas of which it is principally composed, a small portion of carbonic acid gas, and a variety of other substances diffused in different parts of it These are the exhalations which are continually taking place from all kinds of bodies, but especially the aqueous vapour which is unceasingly furnished by evaporation, by which means innumerable multitudes of minute and invisible particles, both dry and humid, are dispersed in all directions, and floating in the atmosphere, mix with the aeriform fluids which are essential to its constitution

Whether the fluids last mentioned, of which the gaseous part of the atmosphere consists, are only mechanically mixed, or are chemically combined so as by their combination to form one fluid or gas, is a question that does not appear to be decided In the early part of the enquiry, the former opinion seems to have prevailed The celebrated Scheele, however, doubted its truth, and contended for the chemical union of the gases His opinion has been strengthened by some subsequent discoveries, and has been adopted by philosophers in general The opposite opinion has been recently revived by Mr John Dalton, of Manchester, who, in his Essay on the Constitution of mixed Gases, &c inserted in the 5th volume of the Manchester Memoirs, has shewn himself an able advocate Mr John Gough controverts the opinion of Mr Dalton, and believes that the gases forming the atmosphere exist in the state of chemical mixture and not

of mechanical mixture, and that uncombined elastic vapour is not mixed with the atmosphere But in proof of the air being the result of a chemical combination of the gases, Dr Thompson, among others, adduces the circumstances of the constancy and exactness of the proportions of the nitrogen and oxygen in air,—the difference between air and the artificial mixture of the gases the latter supporting flame and animal life longer, and flame even better than air itself

Whether the proportions of gases in atmospheric air, at different heights, vary so considerably as 5 or 6 per cent as some have affirmed, or whether the difference be so small as to be with difficulty estimated, is a point upon which philosophers do not yet agree That some difference exists is allowed by many, and several experiments seem to evince that the proportion of oxygen gas is less in greater altitudes, but that at ordinary altitudes the difference is so small as to be scarcely if at all perceptible See AIR

"In analysing the atmosphere in different places," says Mr Davy, "I have never been able to ascertain any notable difference in the proportions of its constituent parts" After noticing the similarity of results obtained from air collected on the sea at the mouth of the Severn, having passed over much of the Atlantic, at Guinea, at London and Kensington, at Paris, in Egypt, and Spain, Mr Davy adds, "we shall find strong reasons for concluding that the atmosphere, in all places exposed to the influence of the winds, contains very nearly the same proportions of oxygen and nitrogen (azot), a circumstance of great importance, for by teaching us that the different degrees of salubrity of air do not depend upon differences in the quantities of its chief constituent parts, it ought to induce us to institute researches concerning the different substances capable of being dissolved or suspended in the air, which are noxious to the human constitution, particularly as an accurate knowledge of their nature and properties would probably enable us, in a great measure, to guard against, or destroy, their baneful effects" Journals of the Royal Institution, vol i

On the state of vapour subsisting in the atmosphere, Mr Kirwan has an elaborate paper in the Irish Transactions, vol viii which he begins by stating that vapour or moisture may subsist not only in dense air, but in air highly rarefied, and, towards the conclusion, makes the following remarks —"As vapours unite to air, partly through the agency of heat, and partly through that of affinity and of electricity, so they separate from it sometimes from a diminution of that degree of heat which they possessed in their nascent state, sometimes from a diminution of affinity, and sometimes from an alteration in their electrical state" "In their first degree of coalescence when separated from air, they form aggregates of exceedingly minute particles, separated from air by the diminution of affinity, and also from each other by electrical atmospheres, these aggregates are of equal, and often lower, specific gravity, than the air in which they are formed, and yet are visible by reason of their opacity, when near the earth they are called fogs, mists, or haze (which differ only in density), and when at greater heights, clouds"

Clement and Desormes, on desiccating atmospheric air, found that a cubic foot of it would deposit 5 89 grains of water Ann de Chemie, No 125

The Uses of the Atmosphere are so many and great, that it seems indeed absolutely necessary, not only to the comfort and convenience of men, but even to the existence of all animal and vegetable life, and to the very constitution of all kinds of matter whatever, and without which they would not be what they are for by insinuating itself into all the vacuities of bodies, it becomes the great spring of most of the mutations here below, as generation, corruption, dissolution, &c and without which none of these operations could be carried on By the mechanical force of the atmosphere too, as well as its chemical properties many important purposes are answered We employ it in giving motion and direction to ships turning mills, and other similar uses and it is one of the great discoveries of the modern philosophers, that the several motions attributed by the ancients to a *fuga vacui* are really owing to the pressure of the atmosphere

Salubrity of the Atmosphere On the top of mountains the air is generally more salubrious than in pits or very deep places Indeed, dense air is always more proper for respiration, as to the mere quality of density only, than that which is rarer But then the air on mountains, though rarer, is freer from phlogistic vapours than that of pits, and hence it has been found that people can live very well on the tops of mountains, even when the air is but about half the density of that below But it would seem that at some intermediate height between the two extremes, the air is the most salubrious and proper for animal life, and this height, according to M Saussure, is about 500 or 600 yards above the level of the sea

Besides the changes arising from the mere difference of altitude, the salubrity of the atmosphere is greatly affected by many other circumstances The air, when confined or stagnant, is commonly more impure than when agitated and shifted thus, all close places are unhealthy, and even the air in a bedchamber is less salubrious in a morning, after it has been slept in, than in the evening The abbé Fontana, from the result of accurate experiments, asserts, "that the difference between the air of one country and that of another, at different times, is much less than what is commonly believed, and yet that this difference in the purity of the air at different times, is much greater than the difference between the air of the different places observed by him" Finally, M Fontana concludes in these words "Nature is not so partial as we

commonly believe She has not only given us an air almost equally good every where at every time, but has allowed us a certain latitude, or a power of living and being in health in qualities of air which differ to a certain degree By this I do not mean to deny the existence of certain kinds of noxious air in some particular places, but only say, that in general the air is good every where and that the small differences are not to be feared so much as some people would make us believe '

Figure of the Atmosphere As the atmosphere envelops all parts of the surface of our globe, if they both continued at rest, and were not endowed with a diurnal motion about their common axi, then the atmosphere would be exactly globular, according to the laws of gravity, for all the parts of the surface of a fluid in a state of rest, must be equally removed from its centre But as the earth and the ambient parts of the atmosphere revolve uniformly together about their axis, the different parts of both have a centrifugal force, the tendency of which is more considerable, and that of the centripetal less, as the parts are more remote from the axis, and hence the figure of the atmosphere must become an oblate spheroid since the parts that correspond to the equator are further removed from the axis, than the parts which correspond to the poles Besides, the figure of the atmosphere must, on another account, represent a flattened spheroid, namely because the sun strikes more directly the air which encompasses the equator, and is comprehended between the two tropics, than that which pertains to the polar regions for, from hence it follows, that the mass of air, or part of the atmosphere, adjoining to the poles, being less heated, cannot expand so much, nor reach so high And yet, notwithstanding, as the same force which contributes to elevate the air, diminishes its gravity and pressure on the surface of the earth, higher columns of it about the equatorial parts, all other circumstances being the same, may not be heavier than those about the poles

Weight or Pressure of the Atmosphere —It is evident that the mass of the atmosphere, in common with all other matter, must be endowed with weight and pressure, and this principle was asserted by almost all philosophers, both ancient and modern But it was only by means of the experiments made with pumps and the barometrical tube, by Galileo and Torricelli, that we came to the proof, not only that the atmosphere is endued with a pressure, but also what the measure and quantity of that pressure is Thus, it is found that the pressure of the atmosphere sustains a column of quicksilver, in the tube of the barometer, of about 30 inches in height, it therefore follows, that the whole pressure of the atmosphere is equal to the weight of a column of quicksilver, of an equal base, and 30 inches height and because a cubical inch of quicksilver is found to weigh nearly half a pound averdupois, therefore the whole 30 inches, or the weight of the atmosphere on every square inch of surface, is equal to 15 pounds Again, it has been found that the pressure of the atmosphere balances, in the case of pumps, &c a column of water of about 34½ feet high, and, the cubical foot of water weighing just 1000 ounces, or 62½ pounds, 34½ times 62½, or 2158lb will be the weight of the column of water, or of the atmosphere on a base of a square foot, and consequently the 144th part of this, or 15lb is the weight of the atmosphere on a square inch the same as before Hence Mr Cotes computed that the pressure of this ambient fluid on the whole surface of the earth, is equivalent to that of a globe of lead of 60 miles in diameter And hence also it appears, that the pressure upon the human body must be very considerable, for, admitting the surface of a man s body to be about fifteen square feet, and the pressure about 15lb on a square inch, he must sustain 32 400lb or nearly 14½ tons weight for his ordinary load And it might be easily shewn that the difference in the weight of air sustained by our bodies in different states of the atmosphere, is often near a ton and a half

Hence, it is so far from being a wonder, that we sometimes suffer in our health by a change of weather, that it is the greatest wonder we do not suffer oftener and more by such changes —For when we consider, that our bodies are sometimes pressed upon by near a ton and a half weight more than at another, and that the variation of the additional pressure of many pounds, is often very sudden, it is surprising that every such change does not entirely break the frame of our bodies to pieces But the fact is, that our bodies always contain some elastic fluid, the spring of which is just sufficient to counterbalance the weight of the atmosphere

One cause, however, either immediate or otherwise it seems, is the heat of the sun, for where this is uniform, the changes are small and regular thus, between the tropics, it seems, the change depends on the heat of the sun, as the barometer constantly sinks about half an inch every day, and rises again to its former station in the night time But in the temperate zones the barometer ranges from 28 to near 31 inches, shewing, by its various altitudes, the changes that are about to take place in the weather If we could know, therefore the causes by which the weather is influenced, we should also know those by which the gravity of the atmosphere is affected These may perhaps be reduced to immediate ones, viz an emission of latent heat from the vapour contained in the atmosphere, or of electric fluid from the same, or from the earth, as it is observed that they both produce the same effect with the solar heat in the tropical climates, viz to rarefy the air, by mixing with it, or setting loose a lighter fluid, which did not before act in such large proportion in any particular place

As to the alteration of heat and cold, Dr Darwin infers, that there is good reason to

conclude that in all circumstances where air is mechanically expanded, it becomes capable of attracting the fluid matter of heat from other bodies in contact with it Now, as the vast region of air which surrounds our globe is perpetually moving along its surface, climbing up the sides of mountains, and descending into the valleys, as it passes along it must be perpetually varying the degree of heat according to the elevation of the country it traverses for, in rising to the summits of mountains, it becomes expanded, having so much of the pressure of the superincumbent atmosphere taken away; and when thus expanded, it attracts or absorbs heat from the mountains in contiguity with it and, when it descends into the valleys and is compressed into less compass, it again gives out the heat it has acquired to the bodies it comes in contact with The same thing must happen in the higher regions of the atmosphere, which are regions of perpetual frost, as has lately been discovered by the aerial navigators When large districts of air, from the lower parts of the atmosphere, are raised two or three miles high, they become so much expanded by the great diminution of the pressure over them, and thence become so cold, that hail or snow is produced by the precipitation of the vapour and as there is, in these high regions of the atmosphere, nothing else for the expanded air to acquire heat from, after it has parted with its vapour, the same degree of cold continues till the air, on descending to the earth, acquires its former state of condensation and of warmth The Andes, almost under the line, rests its base on burning sands about its middle height is a most pleasant and temperate climate covering an extensive plain, on which is built the city of Quito, while its forehead is encircled with eternal snow, perhaps coeval with the mountain Yet, according to the accounts of don Ulloa, these three discordant climates seldom encroach much on each other's territories The hot winds below, if they ascend, become cooled by their expansion, and hence they cannot affect the snow upon the summit and the cold winds that sweep the summit, become condensed as they descend, and of temperate warmth before they reach the fertile plains of Quito See CLIMATE and TEMPERATURE

Height and Density of the Atmosphere Various attempts have been made to ascertain the height to which the atmosphere is extended all round the earth These commenced soon after it was discovered by means of the Torricellian tube, that air is endued with weight and pressure And had not the air an elastic power, but were it every where of the same density, from the surface of the earth to the extreme limit of the atmosphere, like water, which is almost equally dense at all depths, it would be an easy matter to determine its height from its density and the column of mercury which it would counterbalance in the barometer tube for, it having been observed that the weight of the atmosphere is equivalent to a column of 30 inches or two and a half feet of quicksilver, and the density of the former to that of the latter, as 1 to 11040, therefore the height of the uniform atmosphere would be 11040 times two and a half feet; that is, 27600 feet, or little more than five miles and a quarter But the air, by its elastic quality, expands and contracts, and it being found by repeated experiments in most nations of Europe, that the spaces it occupies, when compressed by different weights, are reciprocally proportional to those weights themselves, or, that the more the air is pressed, so much the less space it takes up, it follows that the air in the upper regions of the atmosphere must grow continually more and more rare, as it ascends higher, and indeed that, according to that law, it must necessarily be extended to an indefinite height Now, if we suppose the height of the whole divided into innumerable equal parts, the quantity of each part will be as its density, and the weight of the whole incumbent atmosphere being also as its density, it follows, that the weight of the incumbent air is every where as the quantity contained in the subjacent part, which causes a difference between the weights of each two contiguous parts of air But, by a theorem in arithmetic, when a magnitude is continually diminished by the like part of itself, and the remainders the same, these will be a series of continued quantities decreasing in geometrical progression therefore if, according to the supposition, the altitude of the air, by the addition of new parts into which it is divided, do continually increase in arithmetical progression, its density will be diminished, or, which is the same thing, its gravity decreased, in continued geometrical proportion And hence, again, it appears that, according to the hypothesis of the density being always proportional to the compressing force, the height of the atmosphere must necessarily be extended indefinitely And, farther, as an arithmetical series adapted to a geometrical one, is analogous to the logarithms of the said geometrical one, it follows therefore that the altitudes are proportional to the logarithms of the densities, or weights of air, and that any height taken from the earth's surface, which is the difference of two altitudes to the top of the atmosphere, is proportional to the difference of the logarithms of the two densities there, or to the logarithm of the ratio of those densities, or their corresponding compressing forces, as measured by the two heights of the barometer there Thus, let D denote the density of the air at one place, and d the density at the other, both measured by the column of mercury in the barometrical tube then the difference of altitude between the two places, will be proportional to the log of D — the log of d, or to the log of $\frac{D}{d}$ But as this formula expresses only the relation between different altitudes, and not the absolute quantity of them, assume some indeterminate, but constant quantity h, which multiplying the expression log $\frac{D}{d}$, may be equal to the real

difference of altitude a, that is, $a = h \times \log$ of $\frac{D}{d}$ Then, to determine the value of the general quantity h, let us take a case in which we know the altitude a which corresponds to a known density d, as for instance, taking a = 1 foot, or 1 inch, or some such small altitude then because the density D may be measured by the pressure of the whole atmosphere, or the uniform column of 27600 feet, when the temperature is 55°, therefore 27600 feet will denote the density D at the lower place, and 27599 the less density d at 1 foot above it, consequently $1 = h \times \log$ of $\frac{27600}{27599}$, which, by the nature of logarithms, is nearly $= h \times \frac{4\,4429448}{27600}$ or $\frac{1}{63551}$ nearly, and hence we find $h = 63551$ feet, which gives us this formula for any altitude a in general, viz $a = 63551 \times \log$ of $\frac{D}{d}$, or $a = 63551 \times \log$ of $\frac{M}{m}$ feet, or $10592 \times \log$ of $\frac{M}{m}$ fathoms, where M denotes the column of mercury in the tube at the lower place and m that at the upper This formula is adapted to the mean temperature of the air 55° but it has been found, by the experiments of sir George Shuckburgh and general Roy, that for every degree of the thermometer, different from 55 deg the altitude a will vary by its 435th part, hence, if we would change the factor h from 10592 to 10000, because the difference 592 is the 18th part of the whole factor 10592, and because 18 is the 24th part of 435, therefore the change of temperature, answering to the change of the factor h, is 24°, which reduces the 55° to 31° So that, $a = 10000 \times \log$ of $\frac{M}{m}$ fathoms, is the easiest expression for the altitude, and answers to the temperature of 31°, or very nearly the freezing point and for every degree above that, the result must be increased by so many times its 435th part, and diminished when below it See BAROMETER

From this theorem it follows, that, at the height of three and a half miles, the density of the atmosphere is nearly two times rarer than it is at the surface of the earth; at the height of seven miles, four times rarer, and so on, according to the following table

Height in Miles	Number of times rarer
3½	2
7	4
14	16
21	64
28	256
35	1024
42	4096
49	16384
56	65536
63	262144
70	1048576

And, by pursuing the calculations in this table, it might be easily shewn, that a cubic inch of the air we breathe, would be so much rarefied at the height of 500 miles, that it would fill a sphere equal in diameter to the orbit of Saturn

According to the foregoing reasoning, the altitude of the atmosphere must be indefinite, or, as many would say, it terminates in pure æther One principal effect, however, being the refraction of light, whose particles are the smallest of any we know of in nature, it is reasonable to fix the boundary of the atmosphere, in the altitude where it begins to have the effect of bending the rays of light Now it was found by Kepler and De la Hire after him, who computed the height of the sensible atmosphere from the duration of twilight, and from the magnitude of the terrestrial shadow in lunar eclipses, that the effect of the atmosphere to reflect and intercept the light of the sun, is only sensible to the altitude of between 40 and 50 miles and at that altitude we may collect, from what has been already said, that the air is above 10000 times rarer than at the surface of the earth It is well known that the twilight begins and ends when the centre of the sun is about 18° below the horizon, or only 17° 27′, by subtracting 33′ for refraction which raises the sun so much higher than he would be And a ray coming from the sun in that position, and entering the earth's atmosphere, is refracted and bent into a curve line in passing through it to the eye This curve De la Hire thought to be a cycloid, but Herman shewed that the curve is infinitely extended, and has an asymptote, and, according to Brook Taylor, the curve is one of the most intricate and perplexing that can well be proposed But the rays may be reflected as well as refracted, and if we suppose them to come to the spectator after one reflection the height at which the rays are reflected is found to be about 39 64 miles, while the height at which they are refracted is about 77¼ miles On the supposition of two or more reflections, the altitude will be much decreased but after all, the determination of Kepler and De la Hire is as probable as any See REFRACTION and TWILIGHT

Refractive and reflective Power of the Atmosphere It has been observed, that the atmosphere has a refractive power, by which the rays of light are bent from the right lined direction, as in the case of twilight, and many other experiments manifest the same virtue, which is the cause of many phænomena The atmosphere, or air, has also a reflective power, and this power is the means by which objects are enlightened so uniformly on all sides The want of this power would occasion a strange alteration in the appearance of things, the shadows of which would be so very dark, and their sides enlightened by the sun so very bright, that probably we could see no more of them than their bright halves; so that for a view of the other halves, we must turn them half round, or, if immoveable, must wait till the sun could come round upon them Such a pellucid unreflective atmosphere would in-

deed have been very commodious for astronomical observations on the course of the sun and planets among the fixed stars, visible by day as well as by night, but then such a sudden transition from darkness to light, and from light to darkness, immediately upon the rising and setting of the sun, without any twilight, and even upon turning to or from the sun at noon day, would have been very inconvenient and offensive to our eyes See Keill's Astron Lect 20

ATMOSPHERES OF THE PLANETS Since the planets and their satellites, are now universally allowed to be bodies of a nature similar to the earth we inhabit, there are few, if any, philosophers of the present day who attempt to deny that the planets are surrounded with atmospheres analogous in most respects to that whose properties have been explained in the preceding articles M de la Place in his Système du Monde enters into a considerable detail respecting the atmospheres of the planets "In all the changes to which the atmosphere is subject, says he, vol ii p 128 "the sum of the products of the particles of the revolving body, and its atmosphere, multiplied respectively by the areas they describe round the common centre of gravity, the radii being projected on the plane of the equator remain the same in equal times Supposing, therefore, that by any cause whatever, the atmosphere should be contracted, or that part thereof should become condensed on the surface of the body, the rotatory motion of the body and its atmosphere would be accelerated for, the radii vectores of the areas described by the particles of the original atmosphere becoming smaller, the sum of the products of all the particles, by their corresponding areas, cannot remain the same unless the velocity be augmented The atmosphere is flattened towards the poles, and swelled out at the equator But this oblateness has its limits and in the case where it is greatest, the ratio of the polar and equatorial diameter is as 2 to 3 The atmosphere cannot extend itself at the equator to a greater distance than to the place where the centrifugal force is exactly equal to the force of gravity With regard to the sun, this point is remote from its centre to a distance measuring the radius of the orbit of a planet which would make its revolution in the same period as that luminary employs in its rotation The solar atmosphere cannot, therefore, extend to the orbit of Mercury, and consequently it cannot produce the zodiacal light, which appears to extend even to the orbit of the earth"

ATMOSPHERE (Lunar) See MOON

ATMOSPHERE, in electricity, denotes according to some, that medium which is conceived to be diffused over the surface of electrified bodies, and to some distance around them, and consisting of effluvia issuing from them, by which, other bodies immerged in it become endued with an electricity contrary to that of the body to which the atmosphere belongs

By atmosphere, M Æpinus says, no more is to be understood than the sphere of action belonging to any body, or the neighbouring air electrified by it Sig Beccaria agrees in the same opinion, that electrified bodies have no other atmosphere than the electricity communicated to the neighbouring air, and which goes with the air, and not with the electrified bodies Mr Canton also, having relinquished the opinion that electrical atmospheres were composed of effluvia from excited or electrified bodies, maintained that they only result from an alteration in the state of the electric fluid contained in it, or belonging to the air surrounding these bodies to a certain distance

ATMOSPHERICAL *a* (from *atmosphere*, i e ατμος and σφαιρα,) Belonging to the atmosphere

ATMOSPHERICAL LOGARITHMIC See LOGARITHMIC

ATMOSPHERIC TIDES, certain periodical changes in the atmosphere similar in some respects to those of the sea, and produced in great measure by the same causes

There are two kinds of motion in the atmosphere, which come under this denomination the first is occasioned by the joint influence of the sun and moon upon the body of air with which we are surrounded, in the same manner as they act upon the mass of water, and cause the flux and reflux of the ocean, the second is produced by the heat of the sun alone, which exerting upon the air its well known power of rarefaction and expansion, gives rise to those perpetual changes in the atmosphere which follow him in his course, although such changes are not altogether observable or appreciable by us The former of these are termed by the abbe Mann, attraction tides, and the latter heat-tides The tides of attraction like those of the ocean, and from the like grounds have at the same time at two opposite ends of the globe, projecting parts, and these lie almost in that line which might be drawn from the centre of the earth to that of the moon The heat tides, on the other hand, can take place only on one point of the globe, that is, in the point to which the sun is vertical Their projecting part will be directed towards that luminary, and nearly follows its movements

Bacon, and the most eminent authors who have since his time written on the wind, unanimously observe that the periods of the year most exposed to it are the two equinoxes, that storms are most frequent at the times of new and full moon, and particularly those which happen near the equinoxes, that at periods otherwise calm, a small breeze always takes place at high water, and that a small movement in the atmosphere is each time perceived a little after noon and midnight

For the investigation of this subject, the abbe lays down the following principles 1 The elasticity of fluids is in the inverse ratio of their density 2 The force or elasticity of the air expands and contracts itself in the direct ratio of the weight with which it is loaded, and diffuses itself in the inverse ratio of the force by which it is compressed 3 The air

is rarefied, or diffuses itself, in the direct ratio of the quantity of heat which acts upon it 4 The air, as well as all fluids in general, has a tendency to put itself in equilibrium, and does not rest until it has obtained it

It is impossible, within our limits, to follow the abbe in the application of these principles to the various phænomena of the subject in question, we therefore recommend to the attention of our readers the whole of his Observations on the Flux and Reflux of the Atmosphere, inserted, from the Brussels Transactions, in Tilloch's Philosophical Magazine, vol v In the VIIth volume of that work is a paper On a periodical Variation of the Barometer &c by Luke Howard, esq to which we also refer, and conclude by noticing the observations made by Humboldt, near the equator "I have read," says he, "in the Transactions of the Bengal Society, that the barometer rises and falls there regularly every twenty four hours Here in South America, its motion is more astonishing there are four atmospherical tides every twenty four hours, which depend only on the attraction of the sun, the mercury falls from nine o clock in the morning till four in the evening, it rises from four till eleven o clock, it falls from eleven till half past four in the morning, and reascends from that time till nine o clock neither winds, storms, nor earthquakes have any influence on this motion See farther, Laplace, Exposition du Systeme du Monde, liv iv ch 12

Atmospheric stones See Aerolites

ATOM s (atomus, Latin) 1 Such a small particle as cannot be physically divided (Ray) 2 Any thing extremely small (Shakspeare)

ATO'MICAL a (from atom) 1 Consisting of atoms (Brown) 2 Relating to atoms (Bentley)

Atomical philosophy, the doctrine of atoms, a system which, from the hypothesis that atoms are endued with gravity and motion accounted for the origin and formation of things This philosophy was first broached by Moschus, some time before the Trojan war, but was much cultivated and improved by Epicurus, whence it is denominated the Epicurean philosophy.

A'TOMIST s (from atom) One that holds the atomical philosophy (Locke)

A'TOMY s An atom obsolete (Shakspeare)

To ATO'NE v i (from at one) 1 To agree, to accord (Shakspeare) 2 To stand as an equivalent for (Locke)

To Ato'ne v a 1 To reduce to concord (Drummond) 2 To expiate, to answer for (Pope)

ATO'NEMENT s (from atone) 1 Agreement, concord (Shakspeare) 2 Expiation, expiatory equivalent (Swift)

Atonement, is the averting the punishment due to any one, and which God might justly inflict, by undergoing the penalty in the room of the guilty (Rom v. 1), and this is also called propitiation (Rom iii 25 1 John ii 2)

The definition of Dr Doddridge (Works, vol v p 211) is this —Whatever that is, which being done or suffered either by an offending creature himself, or by another for him, shall secure the honours of the divine government in bestowing upon the offender pardon and happiness, may properly be called a satisfaction or atonement made to God for him After this definition he shews, that Christ has made satisfaction for the sins of all those who repent of their sins, and return to God in the way of sincere, though imperfect obedience See also Watts's Redeemer and Sanctifier (Works, vol iii p 742) The Arminian scheme of atonement is explained in Dr Clark's Sermons, vol viii p 306, and Dr John Taylor's singular hypothesis, in his Scripture Doctrine of Atonement examined, and his Key to the Apostolic Writings

ATO'NIC Relaxation, diminution of strength, weakness, debility It should imply total loss or destitution of tone, but generally expresses mere diminution hypotonic

A'TONY (atonia, ατονια, from α neg and τεινω, to extend) A defect of muscular power

ATOOI, one of the Sandwich islands, discovered by captain Cook in his last voyage This island is about 10 leagues in length, and affords a supply of fish and fowl sufficient for its inhabitants, the number of whom it is supposed amounts to about 30,000 The natives are cannibals, for captain Cook had sufficient proof of their eating the flesh of their enemies Lat 21 57 N Lon 159 40 W

ATO'P ad (from a and top) On the top, at the top (Milton)

ATRABILARIÆ CAPSULÆ See Capsulæ

ATRABILA'RIAN Atrabila'rious a (from atra and bilis, Lat) Melancholy, replete with black choler (Arbuthnot)

ATRABILA'RIOUSNESS s (from atrabilarious) The state of being melancholy

ATRABI'LIARY (from ater, black, and bilis, the bile) Of a melancholy or hypocondriac habit, from an old opinion that such habit was produced by the secretion of high or dark-coloured bile

ATRA BILIS, in ancient medicine, the black bile one of the humours of the ancient physicians, which the moderns call melancholy Dr Perceval suggests that this disorder is occasioned by the stagnation of the gall, by which it is rendered too viscid by the absorption of its fluid parts Bile in this state discharged into the duodenum occasions universal disturbance until it is evacuated It brings on vomiting purging, &c previous to which are fever, delirium &c

ATRACTYLIS Distaff thistle In botany, a genus of the class and order syngenesia polygamia æqualis Receptacle chaffy, down feathery, calyx imbricate, invested with scales,

corol radiate, corollets of the ray five-toothed. Two species: a. humilis of Spain; A. flava of Barbary.

ATRACTOBO'LUS. In botany, a genus of the class and order cryptogamia fungi. Fungus sessile, cupular, with a lid, ejecting fusiform vesicles bearing the seeds. One species only.

ATRA DIES, in antiquity, denotes a fatal day whereon the Romans received some memorable defeat. The word literally imports a black day; a denomination taken from the colour which is the emblem of death and mourning.

ATRA'GENE. In botany, a genus of the class and order polyandria polygynia. Calyxless, corol double, petals numerous, the outer ones larger, seeds tailed. Six species, widely dispersed over the globe, but all exotic to ourselves.

ATRAME'NTAL. ATRAME'NTOUS. *a.* (from *atramentum*, ink. Lat.) Inky, black (*Brown*).

ATRAMENTARIOUS STONES, a name applied to various minerals and neutral salts, of which iron is a component part, and which on that account are adapted to the making of ink.

ATRAPHA'XIS. In botany, a genus of the class and order hexandria digynia. Calyx two leaved; petals two, sinuate, stigmas capitate, seed one. Two species, Armenia and the Cape.

ATREBATII, one of those Belgic colonies which came out of Gaul into Britain, and there retained their ancient name. They originally inhabited the country which is now called Artois, and are mentioned by Cæsar among the nations which composed the Belgic confederacy against him.

ATRE'SIA (from α neg. and τιτραω, *to perforate*.) An imperforate anus, urethra, or vagina.

ATRE'TOUS (from *atresia*.) Imperforate.

ATREUS, in fabulous history, the son of Pelops and Hippodamia, and the father of Agamemnon and Menelaus, is supposed to have been king of Mycenæ and Argos about 1228 years before the Christian æra. He drove his brother Thyestes from court, for having a criminal commerce with Ærope his wife: but understanding that he had had two children by her, he sent for him again, and made him eat them, at which horrid action, the sun, it is said, withdrew his light.

ATRIENSIS, in antiquity, a kind of upper servants or house-stewards, who had the management of the other servants, and the chief care and inspection of the furniture and valuables. These had assistants, called atrarii.

ATRIP, in nautical language, is applied either to the anchor or sails. The anchor is atrip, when it is drawn out of the ground in a perpendicular direction, either by the cable or buoy-rope. The top-sails are atrip, when they are hoisted up to the mast-head, or to their utmost extent.

ATRI'PLEX. Orach, or sea-purslane: a genus of the class and order polygamia monœcia. Herm: calyx five parted inferior, corolless; style two parted, seed one, compressed. Sixteen species scattered over Europe, Asia, and Africa: of which seven are natives of our own country:

A. portulacoides, A. pedunculata, A. littoralis, } found in salt marshes.
A. patula, A. angustifolia, A. erecta, } in wastes and commons.
A. laciniata, on the sea-sands.

A'TRIPLEX FŒTIDA. Atriplex olida. Vulvaria. This plant is the chenopodium vulvaria, foliis integerrimis rhombeo ovatis, floribus conglomeratis axillaribus of Linneus, and its very fetid smell induced physicians to exhibit it in hysterical diseases. It is now superseded by more active preparations.

A'TRIPLEX HORTENSIS. The Linnean name for the atriplex sativa of the pharmacopœias. See ATRIPLEX SATIVA.

A'TRIPLEX SATIVA. The herb and seed of this plant atriplex hortensis caule erecto herbaceo, foliis triangularibus of Linneus, have been exhibited medicinally, but the practice of the present day appears to have totally rejected them.

ATRIUM, in ecclesiastical antiquity, denotes an open place or court before a church, making part of what was called the narthex or ante-temple. The atrium in the ancient churches was a large area or square plot of ground, surrounded with a portico or cloister, situate between the porch or vestibule of the church and the body of the church.

ATRIUM, is used in the canon law for the cemetery, or church-yard.

ATRO'CIOUS. *a.* (*atrox*, Lat.) Wicked in a high degree, enormous (*Ayliffe*).

ATRO'CIOUSLY. *ad.* (from *atrocious*.) In an atrocious manner, with great wickedness.

ATRO'CIOUSNESS. *s.* (from *atrocious*.) The quality of being enormously criminal.

ATRO'CITY. *s.* (*atrocitas*, Latin.) Horrible wickedness (*Wotton*).

ATRO'PA. Deadly night-shade: a genus of the class and order pentandria monogynia. Corol campanulate, stamens distant, berry superior, globular, two-celled. Seven species, mostly of warm climates. The two chiefly noticed are

A. mandragora. MANDRAKE, which see.

A. belladonna. Dwale. See BELLADONNA.

A'TROPHY (*atropia*, ἀτροφια, from α neg. and τρεφω, *to nourish*.) Emaciation and weakness, but without hectic fever. This disease is arranged by Cullen in the class cachexia, and order marcores. When it takes place from too copious evacuations, it is termed atrophia inanitorum, when from famine, atrophia famelicorum, when from corrupted nutriment, atrophia cacochymica, and when from an in-

terruption in the digestive organs, atrophia debilium

ATROPOS, one of the Parcæ, daughters of Nox and Erebus According to the derivation of her name ἄτροπος, *immutabilis*, she is inexorable, and inflexible, and her duty among the three sisters is to cut the thread of life without any regard to sex, age, or quality

To ATTA'CH *v a* (*attacher*, Fr) 1 To arrest, to take or apprehend (*Cowell*) 2 To seize (*Shakspeare*) 3 To lay hold on (*Shakspeare*) 4 To win, to gain over, to enamour (*Milton*) 5 To fix to one's interest (*Rogers*)

ATTA'CHMENT *s* (*attachement*, Fr) 1 Adherence, fidelity (*Addison*) 2 Attention, regard (*Arbuthnot*)

ATTACHMENT, in law, the taking or apprehending a person or thing, either by commandment, or writ The word is formed of the French *attacher*, to fasten, tie, and that from the corrupt Latin *attachiare*, of *attexere*, to weave to, or rather, as others think, from the Celtic *tach*, a nail, and *tacha*, to nail, or the Saxon *tæcan*, to take Lambard makes this difference between an arrest and an attachment, that an arrest proceeds out of an inferior court by precept only, and an attachment out of a higher court, either by precept, or writ, and that a precept to arrest hath these formal words, *duci facias*, &c and a writ of attachment these, *præcipimus tibi quod attachies talem, et habeas eum coram nobis* By this it appears, that he who arrests carries the party arrested to another higher person, to be disposed of forthwith, whereas he that attaches keeps the party attached, and presents him in court at the day assigned in the attachment There is this farther difference, that an arrest lies only upon the body of a man, and an attachment sometimes on his goods too

Attachment by Writ differs from distress in this, that an attachment does not reach lands, as a distress does, and that a distress does not touch the body, which an attachment does Yet the two are frequently confounded together

Attachment out of the Chancery is had of course, upon an affidavit made that the defendant was served with a subpœna, and appears not, or it issueth upon not performing some order or decree

Attachment of Privilege, is by virtue of a man's privilege, to call another to that court whereto he himself belongs, and in respect whereof he is privileged to answer some action

Attachment (Foreign), is an attachment of goods or money found within a liberty or city, to satisfy some creditor within such city or liberty

Attachment out of the Forest, is one of the three courts held in the forest The lowest court is called the court of attachment, or wood-mote court, the mean, swan mote, and the highest, the justice in eyre's seat

This attachment is by three means, by goods and chattels, by body, pledges, and mainprize, or the body only This court is held every forty days throughout the year, whence it is called forty-days court

To ATTA'CK *v a* (*attaquer*, Fr) 1. To assault an enemy (*Philips*) 2 To impugn in any manner

ATTA'CK *s* (from the verb) An assault (*Pope*)

Attack of a Siege, is an effort made by the besiegers with trenches, mines, galleries, &c to make themselves masters of a fortress, in attacking one of its sides

It is a rule always to attack on the weakest side, unless there be superior reasons for the contrary, as was the case at the siege of Lisle in which the part where prince Eugene made his attack, was the strongest in the whole place

Attack (False), is that which is not so vigorously prosecuted, serving only to make a diversion among the besieged, and to oblige them to divide their forces, that the true attack may be carried on with greater success

ATTA'CKER *s* (from *attack*) The person that attacks

ATTACOTTI, an ancient people of Britain, mentioned by St Jerome, as well as in the Notitia Imperii They are represented as allies of the Scots and Picts, and, therefore, were probably their neighbours though their precise situation has not been determined

To ATTA'IN *v a* (*atteindre*, French) 1 To gain, to procure (*Tillotson*) 2 To overtake, to come up with (*Bacon*) 3 To come to, to enter upon (*Milton*) 4 To reach, to equal (*Bacon*)

To ATTA'IN *v n* 1 To come to a certain state (*Arbuthnot*) 2 To arrive at (*Locke*)

ATTA'IN *s* (from the verb) The thing attained not used (*Glanville*)

ATTA'INABLE *a* (from *attain*) That may be attained, procurable (*Tillotson*)

ATTA'INABLENESS *s* (from *attainable*) The quality of being attainable (*Cheyne*)

ATTAINDER (*attincta* and *attinctura*) The stain or corruption of the blood of a criminal capitally condemned, the immediate, inseparable consequence, by the common law, on pronouncing the sentence of death He is then called *attaint*, *attinctus*, stained, or blackened He is no longer of any credit or reputation, he cannot be a witness in any court, neither is he capable of performing the functions of another man for, by an anticipation of his punishment, he is already dead in law This is after judgment for there is great difference between a man convicted and attainted, though they are frequently through inaccuracy confounded together After conviction only, a man is liable to none of these disabilities for there is still in contemplation of law a possibility of his innocence Something may be offered in arrest of judgment the indictment may be erroneous, which will render his guilt uncertain, and thereupon the present conviction may be quashed he may obtain a pardon, or be allowed the benefit of

clergy, both which suppose some latent sparks of merit, which plead in extenuation of his fault But when judgment is once pronounced, both law and fact conspire to prove him completely guilty, and there is not the remotest possibility left of any thing to be said in his favour Upon judgment, therefore, of death, and not before, the attainder of a criminal commences or upon such circumstances as are equivalent to judgment of death, as judgment of outlawry on a capital crime, pronounced for absconding or fleeing from justice, which tacitly confesses the guilt and therefore, upon judgment either of outlawry, or of death, for treason or felony, a man shall be said to be attainted

A person attainted of high treason forfeits all his lands, tenements, and hereditaments, his blood is corrupted, and he and his posterity rendered base, and this corruption of blood cannot be taken off but by act of parliament

Attainders may be reversed or falsified (i e proved to be false) by writ of error, or by plea If by writ of error, it must be by the king's leave, &c and when by plea, it may be by denying the treason, pleading a pardon by act of parliament, &c

ATTA'INMENT s (from *attain*) 1 That which is attained, acquisition (*Grew*) 2 The act or power of attaining (*Hooker*)

To ATTAI'NT v a (*attenter*, Fr) 1 To disgrace, to cloud with ignominy (*Spenser*) 2 To attaint is particularly used for such as are found guilty of some crime or offence (*Spenser*) 3 To taint, to corrupt (*Shakspeare*)

ATTA'INT s (from the verb) 1 Any thing injurious (*Shakspeare*) 2 Stain, spot, taint (*Shakspeare*)

ATTAINT, is a writ that lies after judgment against a jury of twelve men that have given false verdict in any court of record, in an action real or personal, where the debt or damages amount to above 40*s* Stat 5 and 34 Ed III c 7 It is called attaint, because the party that obtains it endeavours thereby to stain or taint the credit of the jury with perjury, by whose verdict he is grieved

The jury who are to try this false verdict must be twenty-four, and are called the grand jury; for the law wills not that the oath of one jury of twelve men should be attainted or set aside by an equal number, nor by less indeed than double the former And he that brings the attaint can give no other evidence to the grand jury, than what was originally given to the petit For as their verdict is now trying, and the question is whether or no they did right upon the evidence that appeared to them, the law adjudged it the highest absurdity to produce any subsequent proof upon such trial, and to condemn the prior jurisdiction for not believing evidence which they never knew

ATTAINT, among farriers, a bruise or hurt on a horse's leg, proceeding either from a blow with another horse's foot, or from an over-reach in frosty weather, when a horse, being rough shod, or having shoes with long caulkers, strikes his hinder foot against his fore-leg

ATTA'INTURE s (from *attaint*) Reproach, imputation (*Shakspeare*)

To ATTA'MINATE v a (*attamino*, Lat) To corrupt, to spoil

ATTALICÆ VESTES, in antiquity, garments made of a kind of cloth of gold

ATTALUS, king of Pergamus, who at his death made the people of Rome heirs of his kingdom, and of all his wealth by will, which raised a great disturbance at Rome, and caused a war in Asia For Tiberius Gracchus, tribune of the people, demanded that the goods of Attalus might be distributed among the people The senate opposed this demand, and ordered the consul to put Gracchus to death, which he refused to execute, but Scipio Nasica, chief priest of Jupiter, throwing his garment upon his head, said, they that love the good and preservation of the commonwealth, let them follow me, and going immediately up to the capitol, he was followed by the senators, who slew Gracchus and all his parties in their seats in the capitol Aristonicus, who affirmed himself to be the son of Attalus, and in that quality thought to enjoy the estate, which the Romans claimed as legatees of the king, was an occasion of a second war in Asia

ATTELABUS In zoology, a genus of the class and order insecta coleoptera antennas moniliform, thicker towards the tip, seated on the snout, head pointed behind inclined Fifty-nine species, generally inhabitants of the leaves of trees in different quarters of the globe They may be thus subdivided

A Jaw bifid feelers filiform

B Jaw one-toothed, hind-feelers hatchet-shaped denominated clerus

C Jaw conic, entire, feelers filiform The Spondylis of Fabricius and others We can only notice the following

1 A coryli, black shells rufous reticulate Found in the leaves of the nut tree, which it rolls into a cylinder closed at each end The avellanæ of Linneus and Gmelin with red thorax and legs is a mere variety

2 A Bachus Purple with gold shades snout and end of the legs black Inhabits Europe on the vine and nut tree

3 A betulæ Black legs formed for skipping Found on the leaves of the birch-tree, the leaves of which it curls up in a very beautiful manner

To ATTE'MPER v a (*attempero*, Lat) 1 To mingle, to weaken by the mixture of something else, to dilute (*Bacon*) 2 To soften, to mollify (*Bacon*) 3 To mix in just proportions (*Spenser*) 4 To fix to something else (*Pope*)

To ATTE'MPERATE v a (*attempero*, Lat) To proportion to something (*Hammond*)

To ATTE'MPT v a (*attenter*, Fr) 1 To attack, to venture upon (*Milton*) 2 To try, to endeavour (*Maccabees*)

ATTE'MPT s (from the verb) 1 An at-

tack (*Bacon*) 2 An essay, an endeavour (*Dryden*)

ATTE'MPTABLE *a* (from *attempt*) Liable to attempts or attacks (*Shakspeare*)

ATTE'MPTER *s* (from *attempt*) 1 The person that attempts (*Milton*) 2 An endeavourer (*Glanville*)

To ATTE'ND *v a* (*attendre*, Fr) 1 To regard, to fix the mind upon (*Shakspeare*) 2 To wait on as a servant (*Shakspeare*) 3 To accompany as an enemy (*Clarendon*) 4 To be present with, upon a summons 5 To accompany, to be appendant to (*Arbuthnot*) 6 To wait on, as on a charge (*Spenser*) 7 To be consequent to (*Clarendon*) 8 To remain to, to await (*Locke*) 9 To wait for insidiously (*Shakspeare*) 10 To be bent upon any object (*Dryden*) 11 To stay for (*Dryden*)

To ATTE'ND *v n* 1 To yield attention (*Taylor*) 2 To stay, to delay (*Davies*) 3 To wait, to be within call (*Spenser*)

ATTE'NDANCE *s* (*attendance*, Fr) 1 The act of waiting on another (*Shakspeare*) 2 Service (*Shakspeare*) 3 The persons waiting, a train (*Milton*) 4 Attention, regard (*Timothy*)

ATTE'NDANT *a* (*attendant*, Fr) Accompanying as subordinate, or consequential (*Milton*)

ATTE'NDANT *s* 1 One that attends (*Shakspeare*) 2 One that belongs to the train (*Dryden*) 3 One that waits as a suitor or agent (*Burn*) 4 One that is present at any thing 5 That which is united with another as a concomitant or consequent (*Watts*)

ATTE'NDER *s* (from *attend*) Companion, associate (*Ben Jonson*)

ATTE'NT *a* (*attentus*, Lat) Intent, attentive, heedful, regardful (*Taylor*)

ATTE'NTATES (*attentata*, Lat) Proceedings in a court of judicature after an inhibition is decreed (*Ayliffe*)

ATTE'NTION (from *ad*, to, and *tendo*, I stretch) A due application of the ear, the eye or the mind, to any thing said or done, in order to acquire a knowledge thereof Attention of mind is not properly an act of the understanding, but rather of the will, by which it calls the understanding from the consideration of other objects, and directs it to the thing in hand Nevertheless, our attention is not always voluntary: an interesting object seizes and fixes it beyond the power of controul According to the degree of attention, objects make a stronger or weaker impression Attention is requisite even to the simple act of seeing the eye can take in a considerable field at one look, but no object in the field is seen distinctly, but that singly which fixes the attention in a profound reverie that totally occupies the attention we scarce see what is directly before us In a train of perceptions, no particular object makes such a figure as it would do singly and apart, for when the attention is divided among many objects, no particular object is entitled to a large share Hence the stillness of night contributes to terror, there being nothing to divert the attention

Horror ubique animos, simul ipsa silentia
terrent *Æneid*, ii

Zara Silence and solitude are ev'ry-where!
Through all the gloomy ways and iron doors
That hither lead, nor human face nor voice
Is seen or heard A dreadful din was wont
To grate the sense, when enter'd here, from
groans
And howls of slaves condemn'd, from clink
of chains,
And crash of rusty bars and creaking hinges,
And ever and anon the sight was dash'd
With frightful faces, and the meagre looks
Of grim and ghastly executioners
Yet more this stillness terrifies my soul
Than did that scene of complicated horrors
Mourning Bride, a 5 s 8

In matters of slight importance, attention is mostly directed by will, and for that reason, it is our own fault if trifling objects make any deep impression Had we power equally to withhold our attention from matters of importance, we might be proof against any deep impression But our power fails us here an interesting object seizes and fixes the attention beyond the possibility of controul and while our attention is thus forcibly attached to one object, others may solicit for admittance, but in vain, for they will not be regarded Thus a small misfortune is scarcely felt in presence of a greater

Lear Thou think'st 'tis much, that this
contentious storm
Invades us to the skin, so 'tis to thee,
But where the greater malady is fix'd,
The lesser is scarce felt Thou'dst shun a
bear,
But if thy flight lay tow'rd the roaring sea,
Thou'dst meet the bear i' th' mouth When
the mind's free,
The body's delicate the tempest in my mind
Doth from my senses take all feeling else,
Save what beats there
King Lear, a 3 s 5

ATTE'NTIVE *a* (from *attent*) Heedful, regardful, full of attention (*Hooker*)

ATTE'NTIVELY *ad* (from *attentive*) Heedfully, carefully (*Bacon*)

ATTE'NTIVENESS *s* (from *attentive*) Heedfulness, attention (*Shakspeare*)

ATTE'NUANT *a* (*attenuans*, Latin) That has the power of making thin, or diluting

ATTE'NUANTS (*attenuantia sc medicamenta*, from *attenuo*, to make thin) Diluents Those substances are so termed, which possess a power of imparting to the blood a more thin and fluid consistence than it had previous to their exhibition, such are water, milk-whey, &c

To ATTE'NUATE *v a* (*attenuo*, Lat) To make thin, or slender (*Boyle*)

ATTE'NUATE *a* (from the verb) Made thin, or slender (*Bacon*)

ATTENUA'TE PEDUNCLE, or SCAPE In

botany, tapered or tapering Becoming gradually smaller towards the flower Opposed to incrassated or thickening Attenuate leaf, a leaf tapering towards one or both extremities

ATTENUATION *s* (from *attenuate*) The act of making any thing thin or slender (*Bacon*)

ATTER *s* (aten, Sax venom) Corrupt matter (*Skinner*)

ATTERBURY (Francis), bishop of Rochester, was the son of Dr Lewis Atterbury, and was born at Middleton near Newport-Pagnel, in Buckinghamshire He was educated at Westminster school, and in 1680 elected a student of Christ Church college, Oxford, where he soon distinguished himself by the elegance and vivacity of his wit and his fondness for polite learning On his taking holy orders, he so distinguished himself by the elegance of his sermons, that he was appointed one of the chaplains in ordinary to king William and queen Mary He exerted himself in the controversy with the papists, by writing an excellent defence of Luther, and engaged in several controversies, particularly with Dr Wake, in which he displayed so much learning, ingenuity, and zeal for the interest of his order, that the lower house of convocation returned him thanks, and the university of Oxford complimented him with the degree of doctor of divinity Upon the accession of queen Anne in 1702, he was appointed one of her majesty's chaplains in ordinary, in 1704 he was advanced to the deanry of Carlisle, in 1707 he was appointed one of the canons residentiary of Exeter, in 1712 he was made dean of Christ Church, and the next year bishop of Rochester During the rebellion in Scotland, in the first year of George the First's reign, he refused to sign the declaration of the bishops, testifying their abhorrence of that rebellion, and an exhortation to the clergy and people under their care, to be zealous in the discharge of their duties to his majesty king George Dr Atterbury constantly opposed the measures of the court in the house of lords, and drew up some of the most violent protests with his own hand At length, however, he fell a victim to the intrigues of his enemies, who, under pretence of his having engaged in a plot in favour of the pretender, were the means of driving him into exile in the year 1723 His learned friend bishop Smalridge, in the speech he made when he presented him to the upper house of convocation, as prolocutor, styles him "Vir in nullo literarum genere hospes, in plerisque artibus et studiis diu et feliciter exercitatus, in maxime perfectis literarum disciplinis perfectissimus" He was the friend of Pope, Swift, and other wits of his time In his controversial writings, he was sometimes too severe upon his adversary, and dealt rather too much in satire and invective He died at Paris, Feb 15 1731 2 and his body being brought over to England was interred in Westminster-abbey, but without any memorial being placed over him

We shall here insert Mr Pope's fine epitaph on the bishop, written in the form of a dialogue between himself and his daughter, supposed to be expiring in his arms, immediately after her arrival in France to see him

Dialogue

She "Yes, we have lived,—one pang, and then we part!
May heaven, dear father! now have all thy heart
Yet, ah! how much we lov'd, remember still,
Till you are dust like me —
He "Dear shade! I will
Then mix this dust with thine—O spotless ghost!
O more than fortune, friends, or country lost!
Is there on earth, one care one wish beside?
Yes, *Save my country, Heav'n*, he said, and died

To ATTEST *v a* (*attestor*, Latin) 1 To bear witness of, to witness (*Addison*) 2 To call to witness (*Dryden*)

ATTEST *s* (from the verb) Witness, testimony attestation (*Milton*)

ATTESTATION *s* (from *attest*) Testimony, witness, evidence (*Woodward*)

ATTIC any thing relating to Attica, or to the city of Athens thus Attic salt in philology, is a delicate poignant sort of wit and humour peculiar to the Athenian writers, Attic witness a witness incapable of corruption, &c

ATTIC ORDER, a kind of little order, after the manner of a pedestal, raised on another larger order, by way of a finish to the building

ATTIC BASE a peculiar kind of base used by the ancient architects in the Ionic order and by Palladio, and some others, in the Doric

ATTIC STORY, in architecture, a story in the upper part of a house, where the windows are usually square

ATTIC DIALECT, in grammar See DIALECT

ATTICA, an ancient kingdom of Greece situated along the north coast of the gulph of Saron, bounded on the west by Megara, mount Cithæron, and part of Bœotia, on the north by the gulph of Euripus now Stretto di negro Ponte, and the rest of Bœotia and on the east by the Europus The chief cities in Attica were Athens, Eleusis, and Rhamnus This kingdom received its name from Atthis, daughter of Cranaus, second king of Athens

ATTICUS, one of Galba's servants who entered his palace with a bloody sword, and declared he had killed Otho (*Tacitus*) T Pomponius, a celebrated Roman knight to whom Cicero wrote a great number of letters, which contained the general history of the age They are now extant, and divided into seventeen books He was such a perfect master of the Greek writers, and spoke their language so fluently, that he was surnamed Atticus He behaved in such a disinterested manner, that he offended neither of the inimical parties at Rome, and both were equally anxious of courting his approbation He died of a fever in his 77th year, B C 32 Corne-

lius Nepos, one of his intimate friends, has written a minute account of his life

ATTI'GUOUS *a* (*attiguus*, Lat) Hard by

To ATTI'NGE *v a* (*attinger*, Fr) To touch lightly or gently

To ATTI'RE *v a* (*attirer*, Fr), To dress, to habit, to array (*Spenser*)

ATTI'RE *s* (from the verb) 1 Clothes, dress, habit (*Davies*) 2 [In hunting] The horns of a buck or stag 3 [In botany] The flower of a plant is divided into three parts, the empalement, the foliation, and the attire

ATTI'RER *s* (from *attire*) One that attires another a dresser

ATTITUDE *s* (*attitude*, Fr) The posture or action in which a statue or painted figure is placed (*Prior*)

ATTLEBURY, a town in Norfolk having a market on Thursdays

ATTO'LLENS AUREM (*attollen* from *attollo*, to lift up) A common muscle of the ear, which arises thin, broad, and tendinous, from the tendon of the occipito frontalis, from which it is almost inseparable, where it covers the aponeurosis of the temporal muscle, and is inserted into the upper part of the ear, opposite to the antihelix Its use is to draw the ear upwards, and to make the parts into which it is inserted tense

ATTO'LLENT *a* (*attollens*, Lat) That raises or lifts up (*Derham*)

ATTORNEY, ATTURNATUS, or ATTORNATUS, in law, a person appointed by another to do something in his stead, particularly to solicit and carry on a law suit The word is compounded of the Latin *ad* to, and the French *tourner*, to turn, q d to turn a business over to another The ancient Latin name, according to Bracton is *responsalis*

ATTORNEY AT LAW, a person retained to prosecute or defend a law suit Attorneys, being properly those who sue out writs, or process, or commence, carry on, and defend actions, in any of the courts of common law, are distinguished from solicitors, as the latter do the like business in the courts of equity, and none are admitted, either as an attorney or solicitor, unless they have served a clerkship of five years, being enrolled, and taken the oath in that case provided, and the judges of their respective courts are required to examine their several capacities By a late order of all the judges, all attorneys are to be admitted of some inns of court or chancery (except housekeepers in London and Westminster &c) and no attorney shall put himself out of that society into which he is admitted till he is admitted to some other society, and deliver a certificate thereof, and all attorneys are to be in common at the times ordered by the society to which they belong, otherwise shall be put out of the roll of attorneys Attorneys may be punished for ill practices and if an attorney, or his clerks, of which he must have but two at one time, do any thing against the express rules of the court, he or they may be committed Attorneys are liable to be punished for the neglect of a client's cause Attorneys have the privilege to sue and be sued only in the courts of Westminster, where they practise

In order to admission as a solicitor or attorney in any of the great courts of sessions in Wales, or in the counties palatine of Chester, Lancaster, or Durham, or in any court of record in England, holding pleas to the amount of 40 shillings, and not in any of the said courts of Westminster, there shall be charged a stamp duty of 50*l* Every attorney, solicitor notary, proctor, agent, or procurator, practising in any of the courts at Westminster, ecclesiastical, admiralty or Cinque port courts in his majesty's courts in Scotland, the great sessions in Wales, the courts in the counties palatine, or any other courts holding pleas to the amount of 40 shillings, or more, shall take out a certificate annually, upon which there shall be charged if the solicitor &c residing within the bills of mortality, a stamp duty of 5*l* in any other part of Great Britain 3*l* Persons practising after the 1st day of November, 1797, without obtaining a certificate, shall forfeit 50*l* and be incapable of suing for any fees An attorney shall not be elected into any office against his will, such as constable, overseer of the poor, or churchwarden, or any office within a borough, but his privilege will not exempt him from serving in the militia, or finding a substitute Black Rep 1123

ATTORNEY OF THE DUCHY OF LANCASTER, the second officer in that court

ATTORNEY GENERAL, a great officer under the king, created by letters patent, whose office is to exhibit informations, and prosecute for the crown in criminal causes, and to file the bills in the exchequer, for any thing concerning the king in inheritance or profits To him come warrants for making of grants, pardons, &c —his salary from the crown is 1000*l* per ann

To ATTO'RNEY *v a* (from the noun) 1 To perform by proxy (*Shakspeare*) 2 To employ as a proxy (*Shakspeare*)

ATTO'RNEYSHIP *s* (from *attorney*) The office of an attorney, proxy (*Shaksp*)

ATTOU'RNMENT *s* (*attournement*, Fr) A yielding of the tenant to a new lord (*Cowell*)

To ATTRA'CT *v a* (*attraho*, *attractum*, Latin) 1 To draw to something (*Brown*) 2 To allure, to invite (*Milton*)

ATTRA'CT *s* (from the verb) Attraction, the power of drawing not used (*Hudibras*)

ATTRA'CTICAL *a* (from *attract*) Having the power to draw to it (*Ray*)

ATTRACTION ATTRACTIO, or TRACTIO, in mechanics, the act of a moving power, whereby a moveable is drawn, or brought nearer to the mover The word is compounded of *ad*, to, and *traho*, I draw As action and reaction are always equal and contrary, it follows, that, in all attraction, the mover is drawn towards the moveable, as much as the moveable towards the mover

ATTRACTION, or ATTRACTIVE POWER, in physics, a general term used to denote the

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cause, power, or principle, by which all bodies mutually tend towards each other, and cohere, till separated by some other power The laws, phenomena, &c of attraction, form the chief subject of Newton's philosophy, these being found to obtain in almost all the wonderful operations of nature

The principle of attraction, in the Newtonian sense of it, was first surmised by Copernicus "As for gravity," says he, "I consider it as nothing more than a certain natural appetence (*appetentia*) that the Creator has impressed upon all the parts of matter in order to their uniting or coalescing into a globular form, for their better preservation, and it is probable that the same power is also inherent in the sun and moon and planets that those bodies may constantly retain that round form in which we see them (De Revol Orb Calest lib 1 cap 9) Kepler calls gravity a corporeal and mutual affection between similar bodies in order to their union (Ast Nov in Introd) And he pronounced more positively that no bodies whatever were absolutely light, but only relatively so, and consequently that all matter was subjected to the power and law of gravitation Ibid

The first in this country who adopted the notion of attraction was Dr Gilbert, in his book De Magnete, and the next was the celebrated lord Bacon, in his Nov Organ lib ii aphor 36, 45, 48 Sylv cent 1 exp 33, also in his treatise De Motu, particularly under the articles of the 9th and the 13th sorts of motion In France it was received by Fermat and Roberval and in Italy by Galileo and Borelli But till Newton appeared, this principle was very imperfectly defined and applied

Before Newton, no one had entertained such correct and clear notions of the doctrine of universal attraction as Dr Hooke who in his "Attempt to prove the Motion of the Earth, 1674, observes that the hypothesis upon which he explains the system of the world is founded upon the three following principles 1 That all the celestial bodies have not only an attraction or gravitation towards their proper centres, but that they mutually attract each other within their sphere of activity 2 That all bodies which have a simple and direct motion continue to move in a right line, if some force, which operates without ceasing, does not constrain them to describe a circle, an ellipse, or some other more complicated curve 3 That attraction is so much the more powerful as the attracting bodies are nearer to each other But Hooke was not able to solve the general problem relative to the law of attraction which would occasion a body to describe an ellipse round another quiescent body placed in one of its foci, this admirable discovery, which requires the aid of the higher geometry, and does the highest honour to the human mind, being reserved for the genius of Newton

Attraction may be considered as it regards celestial bodies, terrestrial bodies and the minuter particles of bodies The first case is usually denoted by the word attraction, or universal gravitation, the second by gravitation, and the third by the words affinity, chemical attraction or molecular attraction Many philosophers are now of opinion that it is the same force contemplated under different aspects, yet constantly subject to the same law

Principle At a finite distance all the bodies in nature attract one another in the direct ratio of the masses, and the inverse ratio of the square of the distance

1 According to a law of Kepler deduced from observation, the radii vectores of planets and comets describe about the sun areas proportional to the times, but this law can only have place so long as the force which incessantly deflects each of these bodies from the right line is constantly directed towards a fixed point, which is the origin of the radii vectores (see CENTRAL FORCES) The tendency, therefore of the planets and comets towards the sun, follows necessarily from the proportionality of the areas described by the radii vectores to the times of description this tendency is reciprocal It is in fact, a general law of nature that action and reaction are equal and contrary whence it results that the planets and comets react upon the sun, and communicate to it a tendency towards each of them

2 The satellites of Uranus tend towards Uranus, and Uranus towards his satellites the satellites of Saturn tend towards Saturn, and Saturn towards them The case is the same with regard to Jupiter and his satellites The earth and moon tend likewise reciprocally the one towards the other The proportionality of the areas described by the satellites to the times of description, concur with the equality of action and reaction, to render these assertions unequivocal

All the satellites have a tendency towards the sun, for they are all animated by a regular motion about their respective planets, as if they had been immoveable whence it results that the satellites are impelled with a motion common also to their planets, that is to say, that the same force, by which the planets tend incessantly towards the sun acts also upon the satellites and that they are carried towards the sun with the same velocity as the planets And since the satellites tend towards the sun, it follows that the sun tends towards them, because of the equality of action and reaction

3 Observations have convinced us that Saturn deviates a little from his path when he is near Jupiter, the largest of the planets, whence it follows that Saturn and Jupiter tend reciprocally the one towards the other Saturn, as was observed by Flamsteed, disturbs the motion of Jupiter's satellites, and draws them a little towards him, which proves that these satellites tend towards Saturn and Saturn towards them

It is therefore true that all the heavenly bodies tend reciprocally towards one another but this tendency, or rather the attractive force which occasions it, appertains not solely to

their aggregate mass, all their moleculæ partake of it, or contribute to it. If the sun acted exclusively upon the centre of the earth, without attracting each of its particles, the undulations of the ocean would be incomparably greater, and very different from those which are daily presented to our view. The tendency of the earth towards the sun is therefore the result of the sum of the attractions exerted upon all the moleculæ, which consequently attract the sun in the ratio of their respective masses: besides, every body upon the earth is attracted towards its centre proportionally to its mass. It reacts therefore upon it, the attraction following the same ratio. If it were otherwise, if all the parts of the earth did not exert upon one another a reciprocal attraction, the centre of gravity of the earth would move by a constantly accelerating motion, till at length it would be lost beyond the limits of the system.

The attraction is therefore universal, reciprocal, and proportional to the mass. It remains to demonstrate that this force is inversely as the square of the distance.

1. Observations have shewn that the squares of the periodic times of the celestial bodies are proportional to the cubes of their mean distances. Further, it is rigorously demonstrable (see CENTRAL FORCES) that when bodies circulate in such manner that the squares of the periodic times are proportional to the cubes of the distances, the central force which actuates them is in the inverse ratio of the square of the distance: therefore, supposing the planets to move in circular orbits (from which they, in fact, differ but little) they are solicited towards the sun by a force which varies inversely as the square of the distance. This supposition is not But the constant relation of the squares of the periodic times, to the cubes of the distances being independent of the excentricity, would doubtless subsist in the case where the excentricity vanishes, that is, if the planets moved in circular orbits. Indeed the truth of the position may be readily established with regard to elliptical orbits; but we omit the demonstration, rather than protract this article to too great a length.

2. If the planets revolve about the sun in virtue of a central force, which is reciprocally the square of the distance, it is natural to infer that the moon is retained in her orbit by a central force directed towards the earth, and which only differs from the gravity of terrestrial bodies in the ratio of the diminution that is occasioned by the augmentation of the square of the moon's distance. Now, it may be shewn that the revolution of the moon about the earth is a phenomenon of the same kind, and to be accounted for in the same manner (that is, by considering the joint operation of the projectile and gravitating forces) as the curvilinear motion of a stone, bullet, or any other projectile near the surface of the earth. If we had engines of a sufficient force to project a body in a right line parallel to the horizon, with the velocity of 24326 Paris feet (nearly five English miles) in a second of time, that body, setting aside the resistance of the air, would revolve about the earth like a moon. For, 24326 is a mean proportional between 39231600, the diameter of the earth, and $15\frac{1}{12}$, the space described in the first second of time by a heavy body falling from quiescence towards the earth. And the periodical time of such a projectile would be nearly equal to 1 hour, 24 minutes, 27 seconds. If this body could be carried to the distance of the moon, and projected in the same direction as that in which the moon moves, with such a velocity as would carry it through 188489 Paris feet in a minute, it would revolve about the earth in the same orbit as is described by the moon. We know from experience, that the motion with which a body near the surface of the earth tends to its centre is such as in a second of time makes it descend through $15\frac{1}{12}$ Paris feet. Supposing this motion to decrease inversely as the square of the distance, at the distance of the moon, which is equal to 60 semidiameters of the earth, it would be 60×60 times less than at the surface of the earth; and therefore at that distance would be sufficient to make a body descend through $15\frac{1}{12}$ Paris feet, in a minute of time. This is, in fact, the space through which the moon, at the distance of 60 semidiameters of the earth, descends from the tangent of its orbit, towards the centre of the earth in a minute of time. For that space is a third proportional to the diameter of the moon's orbit and the arc described in the same time. And 235389000 (the diameter of the moon's orbit in Paris feet) is to 188489 (the arc described in a minute), as 188489 is to $15\frac{1}{12}$. Thus the motion agrees in quantity as well as in direction with the legitimate inferences from the motions of projectiles near the earth. And these phenomena are so perfectly coincident and similar, that they must be referred to the same principles, namely a projectile force and a gravitating force varying inversely as the squares of the distances.

In establishing this law of attraction we have considered the centres of bodies, though the gravity is proper to each of their moleculæ, because, in spheres, pheroids differing but little from them, the attraction of the moleculæ most distant from the attracted point, and those of the nearest moleculæ, mutually compensate in such manner that the total attraction is the same as if the moleculæ were united at their centre of gravity.

This law of spheres suffers various modifications, when the bodies attracted are at the surface or in the interior of the spheres. A body situated within a spherical shell, throughout of the same thickness, is equally attracted on all sides, so that it will remain at rest in the midst of the attractions it experiences. The same thing obtains within an elliptical shell whose interior and exterior surface are similar and similarly placed. Supposing, therefore that the planets are homogeneous spheres, the gravity in their interior diminishes as the distance from their centres, for the exterior enve-

lope contributes not to the gravity, which is only produced by the attraction of a sphere of a radius equal to the distance of the attracted body from the centre of the planet. But this attraction is proportional to the mass of the sphere divided by the square of its radius: the mass is as the cube of the same radius: the gravity of the bodies is therefore proportional to such radius.

It will, however, be proper to observe, 1. That this latter result is only rigorous on the hypothesis of the homogeneity of the planets. They are probably composed of strata more and more dense as they approach the centre: the gravity below the surface diminishes therefore, in a less ratio than in the case of their homogeneity. 2. The same result can only be exact by abstracting the molecular attraction which always obtains when a body is placed upon the surface of a sphere. This attraction is very great at contact, nothing at a sensible distance; whence it results that the molecule in contact and that which is situated at the opposite extremity of the same diameter, do not attract as if they were united at the centre.

We need hardly say how unjust it is in many foreign philosophers to declare against a principle which furnishes so beautiful a view, for no other reason but because they cannot conceive how one body should act on another at a distance. It is certain, philosophy allows of no action but what is by immediate contact and impulsion; for how can a body exert any active power where it does not exist? Yet we see effects without seeing any such impulse, and where there are effects, we can easily infer there are causes whether we see them or no. But a man may consider such effects without entering into the consideration of the causes, as indeed it seems the business of a philosopher to do: for to exclude a number of phenomena which we do see, will be to leave a great chasm in the history of nature; and to argue about the actions which we do not see, will be to build castles in the air. It follows, therefore, that the phenomena of attraction are matter of physical consideration, and as such entitled to a share in the system of physics; but that the causes thereof will only become so when they become sensible, i.e. when they appear to be the effect of some other higher causes, for a cause is no otherwise seen than as itself is an effect, so that the first cause must needs be always invisible: we are therefore at liberty to suppose the causes of attraction what we please, without any injury to the effects. See GRAVITY.

In Sir Isaac Newton's Philosophy, the research into causes is the last thing, and never comes under consideration till the laws and phenomena of the effect are settled, it being to these phenomena that the cause is to be accommodated. The cause even of any the grossest and most sensible action, is not adequately known. How impulse or percussion itself produces its effects, i.e. how motion is communicated by body to body, confounds the deepest philosophers: yet is impulse received not only into philosophy, but into mathematics; and accordingly the laws and phenomena of its effects make the greatest part of common mechanics.

The other species of attraction, therefore, in which no impulse is remarkable, when their phenomena are sufficiently ascertained, have the same title to be promoted from physical to mathematical consideration; and this without any previous inquiry into their causes, which our conceptions may not be proportionate to: let their causes be occult, as all causes strictly speaking are, so that their effects, which alone immediately concern us, be but apparent, and measurable.

Our great philosopher, then, far from adulterating science with any thing foreign or metaphysical, as many have reproached him with doing, has the glory of having thrown every thing of this kind out of his system, and of having opened a new source of sublimer mechanics, which duly cultivated might be of infinitely greater extent than all the mechanics yet known. It is hence alone we must expect to learn the manner of the changes, productions, generations, corruptions, &c. of natural things: with all that scene of wonders opened to us by the operations of chemistry.

Attraction chemical. See AFFINITY and MOLECULAR ATTRACTION.

Attraction of cohesion. See COHESION.

Electrical Attraction, the action of a body actually electrified, or rather of the ambient fluid upon light bodies presented to it within a certain distance.

Philosophers have long conjectured that the electric fluid underwent, in the same manner as light and gravitation, a diminution of force proportional to the square of the distance; but their conjectures were founded merely upon analogy. It was reserved for Coulomb to convert them into a truth demonstrated by the testimony of an ingenious and decisive experiment performed by means of the electric balance. Haüy's Philosophy, by Gregory, vol. I. p. 353.

Magnetical Attraction, the action which the loadstone exercises upon all bodies in nature, but especially upon iron.

Coulomb has demonstrated, by means analogous to those he employed in electricity, that magnetic attractions and repulsions are likewise in the inverse ratio of the square of the distance.

Molecular Attraction, the force by which the molecules of bodies mutually attract each other, and unite more or less closely, when the distance which separates them becomes insensible.

This force received from the earlier chemists the name of affinity; but many authors prefer the denoting it by that of molecular attraction or chemical attraction, the preference being founded upon this, that the latter denomination is simple, that it presupposes nothing, and that it expresses solely what strikes our sense when this force is in action, while the word affinity has been employed from its origin, to express sometimes moral relations, sometimes metaphysical beings, sometimes the connexions

which spring from a common parentage See AFFINITY

Formerly it was usual to distinguish as many species of affinity as presented different phænomena, hence arose the division of affinity into affinity of aggregation, affinity of composition, affinity of dissolution, affinity of precipitation, simple affinity, double affinity, reciprocal affinity, hygrometric affinity, &c &c But all these affinities are only one and the same force considered under different aspects and in different circumstances we reduce them to three, which will comprise all the other, these are, simple attraction, elective attraction, and complex attraction

Simple attraction is that which is exerted between two substances simple or compound, provided that in each the composing principles act only by a collective force

If the two substances are of the same kind, we obtain a homogeneous whole, whose parts are enchained by the attractive force, which then takes the name of force of aggregation or cohesive force A block of marble, a piece of sulphur are formed of homogeneous molecules, which the attraction unites more or less closely, according as it has more or less activity and energy

If the substances in question are of different kinds, the attractive force which operates upon them experiences variations which are treated at large by our ablest chemical authors

Elective Attraction obtains so often as to a compound of two substances there is presented a body which has more attraction with regard to one of the constituents, than those constituents have towards one another In elective attraction there are always three forces in action

Experiment Pour sulphuric acid into a solution of muriate of barytes, the liquor will immediately appear troubled, and a white matter will precipitate itself to the bottom of the vessel Now what takes place in this experiment? The muriatic acid holding to the barytes with a certain force established by nature, is attacked by the sulphuric acid, to which nature has given an attractive force upon the barytes greater than that of the muriatic acid upon that alkaline substance hence, the barytes having been drawn to the muriatic acid by a force greater than what attracted it towards the sulphuric acid, and making a kind of choice between these two bodies, it is taken over to the latter, and forms with it a new compound insoluble in water which is precipitated to the bottom of the vessel

Complex Attraction has place whenever a compound of two substances cannot be decomposed by a simple substance, but by that substance combined with another so that here four forces are brought into action, of which the concourse forms a complex attraction The better to comprehend their action, they may be decomposed, and those which concur to break the existing combinations opposed to those which tend to their conservation To the first of these are given the name of divellent attractions, and to the latter those of quiescent attractions

If the quiescent attractions prevail over the divellent ones, there will not be any change effected in the combinations, but if the divellent attractions are strongest, the existing combinations are dissolved and new ones formed

The laws of molecular may probably be referred to those of universal attraction It is to the illustrious Newton that we are indebted for having established the existence of the attraction between great masses, demonstrated the laws by which that attraction is regulated, and applied it to the unveiling the mechanism of the planetary system the same laws also appeared to him to give birth to the phenomena of molecular attraction, but with regard to the actual identity of these two forces, this great philosopher did little more than form conjectures

The disciples of Descartes sought in the phenomena of molecular attraction new arms to combat the theory of Newton, and thus presented to their vortices, driven without hope from the celestial regions, an asylum where they again took refuge On the other hand the Newtonians endeavoured to prove that these fresh phenomena depended exclusively upon attraction but this attraction appeared to them different from that which animated the great masses, and was subjected to other laws Some made it depend upon the inverse ratio of the cube of the distance, others upon the mixed ratio of the inverse of the square and the inverse of the cube

Buffon was, we believe, the first who maintained against both chemists and mathematicians, the identity of the molecular and the Newtonian attraction But his opinion as to this subject, given in his second View of Nature, can be regarded as little else than a simple guess unsupported by those rigorous proofs which force conviction

M Libes, author of the Nouveau Dictionnaire de Physique, endeavours to reduce the molecular attraction to the Newtonian, to shew that they are one and the same force subject to the same law, to shew how from this general law emanate those particular laws which distinguish molecular attraction, and thus to refer to the admirable principle of gravitation, those phenomena which have been thought to contradict it, though they, in fact, confirm its existence It would lead us far beyond the limits assigned to this article, were we to insert the whole of M Libes's ingenious investigations, we can only quote his most popular argument To shew that two elementary molecules in contact ought to exert upon one another an infinite action, while the law of attraction is directly as the masses and inversely as the squares of the distances his reasoning is simply this If the masses of two finite bodies which attract each other, were to become infinitely small, the attraction which they would exercise the one upon the other

would experience, in respect of the masses, an infinite diminution. But if those masses, thus become infinitely small, are in contact, their centre will be found infinitely near to one another, consequently, the attraction which follows the inverse ratio of the squares of the distances, having augmented infinitely more with regard to the approach of the centres of action, than it has diminished by reason of the extreme minuteness of the masses, the result must be an infinite attraction. See Libes, ubi supra, Lambert's Translation of Berthollet's chemical Statics, and Gregory's translation of Hauy's Philosophy.

Attraction of Mountains, is a late discovery, and a very considerable confirmation of sir Isaac Newton's theory of universal gravity. According to the Newtonian system, an attractive power is not only exerted between those large masses of matter which constitute the sun and planets, but likewise between all comparatively smaller bodies, and even between the smallest particles of which they are composed. Agreeably to this hypothesis, a heavy body, which ought to gravitate or tend toward the centre of the earth, in a direction perpendicular to its surface, supposing the said surface to be perfectly even and spherical, ought likewise though in a less degree, to be attracted and tend towards a mountain placed on the earth's surface, so that a plumb line, for instance, of a quadrant, hanging in the neighbourhood of such a mountain, ought to be drawn from a perpendicular situation, in consequence of the attractive power of the quantity of matter of which it is composed acting in a direction different from that exerted by the whole mass of matter in the earth, and with a proportionably inferior degree of force.

Though sir Isaac Newton had long ago hinted at an experiment of this kind, and had remarked that "a mountain of an hemispherical figure, three miles high, and six broad, would not by its attraction, draw the plumb-line two minutes out of the perpendicular," yet no attempt to ascertain this matter by actual experiment was made till about the year 1738, when the French academicians, particularly Messrs Bouguer and Condamine, who were sent to Peru to measure a degree under the equator, attempted to discover the attractive power of Chimboraço, a mountain in the province of Quito. According to their observations, which were however made under circumstances by no means favourable to an accurate solution of so nice and difficult a problem, the mountain Chimboraço exerted an attraction equal to eight seconds. Though this experiment was not perhaps sufficient to prove satisfactorily even the reality of an attraction, much less the precise quantity of it, yet it does not appear that any steps had been since taken to repeat it.

In the year 1772, the present astronomer royal, Dr Maskelyne, made a proposal for this purpose to the Royal Society; and in 1774 he was deputed to make the trial, accompanied with proper assistants, and furnished with accurate instruments. The mountain Schehallien, situated nearly in the centre of Scotland, was pitched upon as the most proper for the purpose that could be found in this island. The observations were made by taking the meridian zenith distances of different fixed stars near the zenith, by means of a zenith sector of ten feet radius, first on the south, and afterwards on the north side of the hill, the greatest length of which extended in an east and west direction.

It is evident, that if the mass of matter in the hill exerted any sensible attraction, it would cause the plumb line of the sector, through which an observer viewed a star in the meridian, to deviate from its perpendicular situation, and would attract it contrarywise at the two stations, thereby doubling the effect. On the south side the plummet would be drawn to the northward, by the attractive power of the hill placed to the northward of it; and on the north side, a contrary and equal deflection of the plumb line would take place in consequence of the attraction of the hill, now to the southward of it. The apparent zenith distances of the stars would be affected contrarywise, those being increased at the one station which were diminished at the other; and the correspondent quantities of the deflection of the plumb-line would give the observer the sum of the contrary attractions of the hill acting on the plummet at the two stations, the half of which will of course indicate the attractive power of the hill.

The various operations requisite for this experiment lasted about four months, and from them it appears, that the sum of the two contrary attractions of the mountain Schehallien in the two temporary observations which were successively fixed half-way up the hill (where the effect of its attraction would be greatest) was equal to 11″ 6. Its half, therefore, or 5″ 8 is the mean attraction of the mountain.

The inferences drawn from these experiments may be reduced to the following.

"1. It appears that the mountain Schehallien exerts a sensible attraction; therefore, from the rules of philosophising, we are to conclude that every mountain, and indeed every particle of the earth is endued with the same property, in proportion to its quantity of matter.

"2. The law of the variation of this force, in the inverse ratio of the squares of the distances, as laid down by sir Isaac Newton, is also confirmed by this experiment. For if the force of attraction of the hill had been only to that of the earth as the matter in the hill to that of the earth, and had not been greatly increased by the near approach to its centre, the attraction thereof must have been wholly insensible. But now, by only supposing the mean density of the earth to be double to that of the hill, which seems very probable from other considerations, the attraction of the hill will be reconciled to the general law of the variation of attraction in the inverse duplicate

ratio of the distances, as deduced by sir Isaac Newton from the comparison of the motion of the heavenly bodies with the force of gravity at the surface of the earth; and the analogy of nature will be preserved.

"3. We may now, therefore, be allowed to admit this law, and to acknowledge, that the mean density of the earth is at least double of that at the surface, and consequently that the density of the internal parts of the earth is much greater than near the surface. Hence also, the whole quantity of matter in the earth will be at least as great again as if it had been all composed of matter of the same density with that at the surface, or will be about four or five times as great as if it were all composed of water.—This conclusion, Dr. Maskelyne adds, is totally contrary to the hypothesis of some naturalists, who 'suppose the earth to be only a great hollow shell of matter, supporting itself from the property of an arch, with an immense vacuity in the midst of it.' But, were that the case, the attraction of mountains, and even smaller inequalities in the earth's surface, would be very great, contrary to experiment, and would affect the measures of the degrees of the meridian much more than we find they do, and the variation of gravity, in different latitudes, in going from the equator to the poles, as found by pendulums, would not be near so regular as it has been found by experiment to be.

"4. As mountains are by these experiments found capable of producing sensible deflections of the plumb lines of astronomical instruments, it becomes a matter of great importance, in the mensuration of degrees in the meridian, either to choose places where the irregular attractions of the elevated parts may be small, or where by their situation, they may compensate or counteract the effects of each other." Phil. Trans. vol. 65. See also the important observations and calculations relative to this subject by Dr. Hutton, in Phil. Trans. vol. 68. And an ingenious paper by Mr. Cavendish in vol. 88. of those Transactions.

ATTRA'CTIVE. a. (from *attract*.) 1. Having the power to draw any thing (*Milton*). 2. Inviting; alluring; enticing (*Shakspeare*).

ATTRA'CTIVE. s. (from *attract*.) That which draws or incites; allurement (*South*).

ATTRA'CTIVELY. ad. (from *attractive*.) With the power of attracting.

ATTRA'CTIVENESS. s. (from *attractive*.) The quality of being attractive.

ATTRA'CTOR. s. (from *attract*.) The agent that attracts; a drawer (*Brown*).

A'TTRAHENT. s. (*attrahens*, Lat.) That which draws (*Glanville*).

ATTRI'BUTABLE. a. (*attribuo*, Lat.) That may be ascribed or attributed; ascribable; imputable (*Hale*).

To ATTRI'BUTE. v. a. (*attribuo*, Lat.) 1. To ascribe; to yield as due (*Tillotson*). 2. To impute, as to a cause (*Newton*).

ATTRIBUTE, in a general sense, that which agrees with some person or thing; or a quality determining something to be after a certain manner. Thus understanding is an attribute of mind, and extension an attribute of body. That attribute which the mind conceives as the foundation of all the rest, is called its essential attribute: thus extension is by some, and solidity by others, esteemed the essential attributes of body or matter.

ATTRIBUTES, in theology, the several qualities or perfections of the divine nature. The perfections of God are called his attributes, because he cannot be without them. The natural attributes of the Supreme Being may be comprehended under power and knowledge; the moral ones under justice and benevolence. See Hartley on Man, vol. ii. Groves's Works, vol. ii. Doddridge's Works, vol. iv. Balguy's Divine Rectitude, Wollaston's Rel. of Nature, p. 116—119, &c.

ATTRIBUTES, in logic, are the predicates of any subject; or what may be affirmed or denied of any thing.

ATTRIBUTES, in painting and sculpture, are symbols added to several figures, to intimate their particular office and character. Thus the eagle is an attribute of Jupiter; a peacock, of Juno; a caduceus, of Mercury; a club, of Hercules; and a palm, of Victory.

ATTRIBU'TION. s. (from *To attribute*.) Commendation; qualities ascribed (*Shaks.*).

ATTRIBUTIVES, in grammar, are words which are significant of attributes: and thus include adjectives, verbs, and participles, which are attributes of substances; and adverbs, which denote the attributes only of attributes.

ATTRI'TE. a. (*attritus*, Lat.) Ground; worn by rubbing (*Milton*).

ATTRI'TENESS. s. (from *attrite*.) The being much worn.

ATTRI'TION. s. (*attritio*, Latin.) 1. The act of wearing things by rubbing one against another (*Woodward*). 2. The state of being worn. 3. Grief for sin arising only from the fear of punishment; the lowest degree of repentance.

To ATTU'NE. v. a. (from *tune*.) 1. To make any thing musical (*Milton*). 2. To tune one thing to another.

ATWE'EN. ATWIXT. *ad.* or *prep.* Betwixt; between; in the midst of two things: obsolete (*Spenser*).

ATWOOD'S MACHINE, the name which is very properly applied to the ingenious apparatus invented by the late Mr. Atwood of Trinity college, Cambridge, to illustrate the doctrines of accelerated motion. This machine has been found to answer the purpose far more completely than any other we have heard of, discovering at once the quantity of matter moved, the force which moves it, the space described from rest, the time of description, and the velocity acquired.

The velocity produced by the undiminished force of gravity, is much too great to be conveniently submitted to experimental examination, but by means of this apparatus, we can diminish it in any degree that is required. Two boxes which are attached to a thread passing over a pulley, may be filled with different

weights, which counterbalance each other, and constitute, together with the pulley, an inert mass, which is put into motion by a small weight added to one of them The time of descent is measured by a second's, or a half-second's pendulum, the space described being ascertained by the place of a moveable stage, against which the bottom of the descending box strikes and when we wish to determine immediately the velocity acquired at any point, by measuring the space uniformly described in a given time, the accelerating force is removed, by means of a ring, which intercepts the preponderating weight, and the box proceeds with a uniform velocity, except so far as the friction of the machine retards it By changing the proportion of the preponderating weight to the whole weight of the boxes, it is obvious that we may change the velocity of the descent, and thus exhibit the effects of forces of different magnitudes For a more minute description of this curious and useful apparatus illustrated by plates, see Atwood on Rectilineal and Rotatory Motion, p 298, or Gregory's Mechanics, vol ii p 64

ATYADÆ, the first race of kings who reigned in Lydia, so called from Atys the son of Cotys and grandson of Manes The atyadæ were succeeded by the heraclidæ

ATYS, in fabulous history See ATYADÆ

AVA, in geography, an empire in India, beyond the Ganges, in Asia It is bounded by Mogulstan on the west, Siam on the south, Tonquin and Cochin China on the east and Thibet and China on the north The metropolis of this empire is of the same name, and is situated in Lat 21 0 N Lon 96 30 E

AVA, in natural history, the intoxicating juice of the piper methysticum (see PIPER,) obtained from its root, which the natives of the South sea islands bruise for this purpose, and afterwards chew with an effect vastly more exhilarating than the mastication of tobacco

To AVA'IL *v a* (from *valoir*, French) 1 To profit, to turn to profit (*Dryden*) 2 To promote, to prosper, to assist (*Pope*)

AVA'IL *s* (from *To avail*) Profit, advantage, benefit (*Locke*)

AVA'ILABLE *a* (from *avail*) 1 Profitable, advantageous (*Hooker*) 2 Powerful, having force (*Raleigh*)

AVA'ILABLENESS *s* (from *avail*) 1 Power of promoting the end for which it is used (*Hale*) 2 Legal force, validity

AVA'ILABLY *ad* (from *available*) 1 Powerfully, profitably advantageously 2 Legally, validly

AVA'ILMENT *s* (from *avail*) Usefulness, advantage profit

AVALANCHE, or LAVANGE, according to Baretti and others, a prodigious mass or ball of snow which is blown down from the top of a mountain by the wind, or falls by some other accident, which gathering all the way in its descent becomes instantly of such a prodigious size, that there is hardly any avoiding being carried away with it, man and beast, and smothered in it One of these balls Baretti saw rolling down, but as it took another course than his, he had no apprehensions of danger from it

Lavanges or avalanches take place when the snow, falling in vast flakes, is agitated on the flank of the mountains, particularly Mount Blanc, by impetuous winds, which fold it on itself and condense it At those times a species of balloons formed by the snow, is frequently precipitated of which the bulk increases so greatly that even the rocks cannot arrest those prodigious masses in their redoubled fall

Already the terrified inhabitant of the valleys conscious of his approaching destruction, and unable to flee from it, presages the disaster from the horrible hissing noise which attends it He is often the victim before he is struck Whole forests have been rooted up, houses, and even entire villages completely overturned and swept away before the immediate shock of the lavange, by the explosion of the forcibly compressed air

Several chests of goods which were in the cellar of a house thus rased, were burst open by the explosion and hurled into the street It was seen with wonder that part of the effects contained in them, were cast on the opposite mountain, to the height of sixty feet above the base It was also observed that the house was overthrown some little time before the mass of snow and the shock reached it

When these masses, driven on declivities, preceded and followed by the ruins which they drag along, happen to reach in the valleys, not the least vestiges of the inhabitants or their flocks remain every thing is annihilated, or at least buried under the ruins of the mountain, which often fill up the straits or narrow passages, to a considerable height

The lavanges are however not constantly so destructive every thing depends on the locality, they sometimes only form snow bridges over torrents In the highest regions there are some which last for ages

These snow balls are not always formed by hurricanes, they are sometimes produced in calm weather A single stone casually tumbled from a summit is enough to cause great devastation in an instant When the mantle of snow on the mountains begins to condense, the natives dread the least breath of wind the least vibration, they fear even the noise of the waters The traveller dares not crack his whip The shepherds hardly venture to breathe, they moderate the march of their flocks, and take off the bells from the wethers so much do they dread shaking the atmosphere!

In the rank of avalanches the natives place the overflowing of lakes, especially when they fall one into the other, but then the destruction is no longer partial, the whole canton is threatened

Those lakes which are situated on the mountains at an elevation of a thousand or twelve hundred fathoms freeze early When the surface of the lake is frozen over, it sustains the snows and icicles which perpetually keep falling into that large funnel Here they heap up

in a pyramidal form, and this heavy mass, when the borders of its floor melt, displacing a quantity of water equal to its enormous bulk, occasions an inundation which continues fourteen or fifteen hours, so that strangers at Barege are surprised to see in the finest summer days, the little river Bastan swell suddenly and that without any previous tempest

Thomson, in his Seasons, describes the avalanches thus

> Among these hilly regions, where embrac d
> In peaceful vales the happy Grisons dwell,
> Oft, rushing sudden from the loaded cliffs,
> Mountains of snow their gath ring terrors roll,
> From steep to steep loud thund ring down they come,
> A wintry waste in dire commotion all,
> And herds, and flocks, and travellers and swains,
> And sometimes whole brigades of marching troops,
> Or hamlets sleeping in the dead of night,
> Are deep beneath the smothering ruin hurl d *Winter*, ver 414

To AVA'LE, *v a* (*avaler*, Fr to let sink) To let fall to depress out of use (*Wotton*)

To AVA'LE *v n* To sink (*Spenser*)

AVANT, a French preposition, signifying before, or any priority either in respect of time or place, sometimes used, in composition, in our language, but more usually contracted, and wrote vaunt or vant, or even van

AVA'NTGUARD *s* (*avantgarde*, Fr) The van the first body of an army (*Hayw*)

AVANTURINE, in natural history, a yellowish stone full of sparkles, resembling gold, very common in France An artificial imitation of it is made by mixing sparkles of copper with glass whilst it is in fusion, which is used by enamellers, and to sprinkle as sand upon writings It may be regarded according to its composition either as a species of quartz or breccia

AVARES, or AVARI, a tribe of Sarmatian origin, denoting far distant, and formerly applied to a class of the inhabitants of the southern parts of Russia, from their dwelling farther to the east than any of the Sarmatian stocks

AVARICUM See BOURGES

AVATSCHA, or AWATSKA, a seaport and bay of Kamtschatka, lying in N lat 52 51 and E Lon 158 48

A'VARICE *s* (*avarice*, Fr) Covetousness, insatiable desire (*Dryden*)

AVARI'CIOUS *a* (*avaricieux*, Fr) Covetous insatiably desirous (*Broome*)

AVARI'CIOUSLY *ad* (from *avaricious*) Covetously

AVARI'CIOUSNESS *s* (from *avaricious*) The quality of being avaricious

AVAST, in sea language, a term requiring to stop, or to stay

AVATAULAS, a sect of Indian Bramins, who surpass all the rest in austerity

AVAUNCHERS, among hunters, the second branches of a deer s horns

AVAUNT *interject* (*avant*, Fr) A word of abhorrence, by which any one is driven away (*Shakspeare*)

AUBADE, in music, a concert given at daybreak in hot climates, in the open air, generally by a lover under the window of his mistress

AUBAINE, in the customs of France before the republic, a right vested in the king of being heir to a foreigner that died within his dominions, notwithstanding any testament the deceased might leave Ambassadors were not subject to the right of aubaine

AUBE, a river of France, which rises near Auberive, in the department of the Upper Marne, passes by Ferte sur Aube, Bar sur Aube, Dienville, Arcis, &c and joins the Seine, seven miles below Mery It gives name to a department which it waters

AUBENAS, a town of France, in the department of the Ardeche and chief place of a canton, in the district of Coiron three leagues and a half SW Privas Lon 22 3 E Ferro Lat 44 32 N

AUBENTON, a town of France in the department of the Aisne and chief place of a canton, in the district of Vervins nine leagues NE Laon, and three and three quarters E Vervins

AUBERG, a town of Germany, in the archduchy of Austria, on the north side of the Danube opposite Lintz

AUBERIVE, a town of France in the department of the Marne, and chief place of a canton in the district of Reims, on the Suippe fifteen miles N Chalons

AUBERIVE a town of France, in the department of the Upper Marne, and chief place of a canton, in the district of Langres twelve miles SW Langres

AUBERIVE, a town of France in the department of the Isere, and chief place of a canton, in the district of Vienne five miles S Vienne

AUBIER, or ALBURNUM that part of the wood which is next the bark of trees, and which is softer, whiter, and more juicy than the rest (*Ph* iv 380)

AUBIGNY, in geography, a town in the department of Cher, and late province of Berry in France, situated on the river Nere Lat 47 27 N Lon 2 30 E

AUBLETIA In botany, a genus of the class and order polyandria, monogynia Calyx five leaved, petals five capsule burrs or muricate many celled Four species all natives of Cayenne or Guiana all trees with alternate leaves and flowers in racemes

AUBONNE a town of Bern in Switzerland Lat 46 30 N Lon 6 30 E

AUBURN, a town of Wiltshire, with a market on Tuesday Lat 51 31 N Lon 1 32 W

A'UBURNE *a* (from *aubour*, Fr) Brown, of a tan colour (*Philips*)

AUCAUGREL the capital of the kingdom of Adel in Africa Lat 9 10 N Lon 44 25 E

AUCH a town in France in the department of Gers, late the capital of Gascony Lat 43 39 N Lon 0 40 E

AUCTION, Auctio, a public sale very much in use for estates, household goods, &c In this method of sale the highest bidder before the hammer is down is always the buyer In some parts of Flanders it is the first bidder that is the purchaser The auctioneer puts up the article at what he thinks the full value, and gradually lowers the sum till some person bids, and this person is the buyer In this method, as soon as the article comes down to a fair price, a person who is desirous of becoming a purchaser is sure to bid, lest another should speak before him, and there is no bidding a second time, as at our auctions

To A'uction *v a* (from the noun) To sell by auction

AUCTIONARY *a* (from *auction*) Belonging to an auction (*Dryden*)

AUCTIONEER *s* (from *auction*) The person that manages an auction Every auctioneer must take out an annual licence, of 1*l* 3*s* within the bills of mortality and 5*s* 9*d* without besides which, duties are imposed on goods sold by auction

A'UCTIVE *a* (from *auctus*, Lat) Of an increasing quality

AUCTORATI, in Roman antiquity such as degraded themselves by letting themselves for money to perform in the games

AUCTUS, (increased) calyx See Calyculate

AUCU'BA In botany, a genus of the class and order monœcia, tetrandria Male calyx four toothed, corol four petalled berry one-seeded Fem calyx four-toothed corol four-petalled, nectaryless, root one celled The only known species is a tree native of Japan

AUCUPA'TION *s* (*aucupatio*, Latin) Fowling, bird-catching

AUDA'CIOUS *a* (*audacieux*, Fr) Bold, impudent, daring (*Dryden*)

AUDA'CIOUSLY *ad* (from *audacious*) Boldly impudently (*Shakspeare*)

AUDA'CIOUSNESS *s* (from *audacious*) Impudence

AUDA'CITY *s* (from *audax* Lat) Spirit, boldness, confidence (*Tatler*)

AUDEANISM, the same with anthropomorphism Audeus, the chief of the Audeans, obtained the name of an heretic, and the punishment of banishment, for celebrating Easter in the manner of the Jews, and attributing an human form to the Deity He died in the country of the Goths, about the year 370 See Anthropomorphites

A'UDIBLE (from *audibilis*, Latin) 1 That may be perceived by hearing (*Grew*) 2 Loud enough to be heard (*Bacon*)

A'UDIBLENESS *s* (from *audible*) Capableness of being heard

A'UDIBLY *ad* (from *audible*) In such a manner as to be heard (*Milton*)

A'UDIENCE *s* (*audience*, French) 1 The act of hearing or attending to any thing (*Milton*) 2 The liberty of speaking granted, a hearing (*Hooker*) 3 An auditory, persons collected to hear (*Atter*) 4 The reception of any man who delivers a solemn message (*Dry*)

Audience given to ambassadors, a ceremony observed in courts on the admission of ambassadors or public ministers to a hearing In England, audience is given to ambassadors in the presence chamber, to envoys and residents, in a gallery, closet, or in any place where the king happens to be Upon being admitted, as is the custom of all courts, they make three bows, after which they cover and sit down, but not before the king is covered and seated, and has given them the sign to put on their hats When the king does not care to have them covered, and sit, he himself stands uncovered, which is taken as a slight

A'udience court A court belonging to the archbishop of Canterbury, of equal authority with the arches court, though inferior both in dignity and antiquity (*Cowell*)

AUDIENTS, or Auditors, in church history, an order of catechumens, consisting of those who were newly instructed in the mysteries of the church religion, and not yet admitted to baptism

AUDIT, a regular hearing and examining of an account, by officers appointed for that purpose See Auditor

To A'udit *v a* (from the noun) To take an account finally (*Arbuthnot*)

AUDI'TION *s* (*auditio* Lat) Hearing

A'UDITOR *s* (*auditor* Latin) 1 A hearer (*Sidney*) 2 A person employed to take an account ultimately (*Shakspeare*) The king and other great personages have auditors who examine yearly the accounts of the inferior officers, and make up from them a general book Thus we have an auditor of the receipts, auditor of the revenue auditors collegiate &c

A'UDITORY *a* (*auditorius*, Latin) That has the power of hearing (*Newton*)

A'uditory *s* (*auditorium*, Latin) 1 An audience, a collection of persons assembled to hear (*Atterbury*) 2 A place where lectures are to be heard

Auditory, Auditorium, in the ancient churches, was that part of the church where the audientes stood to hear, and be instructed The auditorium was that part now called navis ecclesiæ See Nave

Auditory nerve See Nervus auditorius

Auditory nerves *Nervi auditorii* The seventh pair of nerves, which are distributed on the organ of hearing See Portio mollis

Auditory passage See Meatus auditorius externus and internus

A'UDITRESS *s* A woman that hears

To A'VEL *v a* To pull away

AVELLANE or cross Avellane, in heraldry, a form of cross, which resembles four filberds in their husks or cases, joined together at the great end

AVELLINO, a town of Italy in the kingdom of Naples, and Principato Ultra, the see of a bishop, suffragan of the archbishop of Benevento It was nearly destroyed by an earthquake, in the month of September 1694 sixteen miles S Benevento

AVE-MARIA, the angel Gabriel's salutation of the Virgin Mary, when he brought her the tidings of the incarnation.—It is become a prayer or form of devotion in the Romish church. The chaplets and rosaries are divided into so many ave-marias, and so many paternosters, to which the members of the Romish church attribute great spiritual efficacy.

AVENA. Oat-grass: a genus of the class and order triandria, digynia. Calyx two-valved, from one to five-flowered; exterior valve of the corol with a twisted awn on the back. Thirty-four species scattered over the globe, of which seven are indigenous to our own country. The a. sativa or oat uniformly cultivated in husbandry, is a native of Chili, and bears transplanting to most countries. See HUSBANDRY.

AVENA (Lat. an oaten straw.) In ancient melody, a reed supposed to constitute the third kind of musical instrument used by antiquity, and succeeded that formed of the horns of quadrupeds. The first were shells. So simple was the origin of music.

A'VENAGE. s. (of *avena*, oats, Latin.) A certain quantity of oats paid to a landlord.

AVENCHE, formerly the capital of Swisserland, is at present but a small town in the canton of Bern. Lat. 46. 50 N. Lon. 6. 52 E.

To AVE'NGE. *v. a.* (*avenger*, Fr.) 1. To revenge (*Isaiah*). 2. To punish (*Dryden*).

AVE'NGEANCE. *s.* (from *avenge*.) Punishment (*Philips*).

AVE'NGEMENT. *s.* (from *avenge*.) Vengeance, revenge (*Spenser*).

AVE'NGER. *s.* (from *avenge*.) 1. Punisher (*Milton*). 2. Revenger, taker of vengeance (*Dryden*).

AVENIUM FOLIUM. In botany, a veinless leaf, or one without perceptible veins.

AVENOR, an officer belonging to the king's stables, who provides oats for the horses. He acts by warrant from the master of the horse.

AVENS, in botany. See CARYOPHYLLATA, and GEUM.

AVENTINUS MONS, one of the seven hills on which ancient Rome stood. The origin of the name Aventinus is uncertain; but this hill was also called Murcius, from Murcia the goddess of sloth, who had a little chapel there; and Collis Dianæ, from the temple of Diana; likewise Remonius, from Remus, who wanted to build the city, and who was buried there. It was taken within the compass of the city by Ancus Marcius.

AVENTURA, in old writers, Tournaments.

AVE'NTURE. *s.* (*aventure*, Fr.) A mischance, causing a man's death, without felony (*Cowell*).

A'VENUE. *s.* (*avenue*, French.) 1. A way by which any place may be entered (*Clarend.*).

AVENUE, in gardening, a walk planted on each side with trees, and leading to a house, garden gate, wood, &c. and generally terminated by some distant object. All avenues that lead to a house ought to be at least as wide as the whole front of the house; if wider they are better still; and avenues to woods and prospects ought not to be less than 60 feet wide. The trees should not be planted nearer to one another than 35 feet, especially if they are trees of a spreading kind; and the same ought to be the distance, if they are for a regular grove. The trees most proper for avenues with us, are the English elm, the lime, the horse-chesnut, the common chesnut, the beech, and the abele. The old method of planting avenues was with regular rows of trees; but we have now a much more magnificent way of setting the trees in clumps or platoons, making the opening much wider than before, and placing the clumps of trees at about 300 feet distance from one another.

To AVE'R. *v. a.* (*averer*, Fr.) To declare positively, or peremptorily (*Prior*).

A'VERAGE. *s.* (*averagium*, Latin.) 1. That duty or service which the tenant is to pay to the king or other lord, by his beasts and carriages (*Chambers*). 2. A medium, a mean proportion.

AVERAGE, in commerce, signifies the accidents and misfortunes which happen to ships and their cargoes, from the time of their loading and sailing to their return and unloading, and is divided into three kinds. 1. The simple or particular average, which consists in the extraordinary expenses incurred for the ship alone, or for the merchandizes alone. Such is the loss of anchors, masts, and rigging, occasioned by the common accidents at sea; the damages which happen to merchandize by storm, prize, shipwreck, wet, or rotting; all which must be borne and paid by the thing which suffered the damage. 2. The large and common average, being those expenses incurred, and damages sustained for the common good and security both of the merchandizes and vessels, consequently to be borne by the ship and cargo, and to be regulated upon the whole. Of this number are the goods or money given for the ransom of the ship and cargo, things thrown overboard for the safety of the ship, the expenses of unlading for entering into a river or harbour, and the provisions and hire of the sailors when the ship is put under an embargo. 3. The small averages, which are the expenses for towing and piloting the ship out, off, or into harbours, creeks, or rivers, one-third of which must be charged to the ship, and two thirds to the cargo.

Average is more particularly used for a certain contribution that merchants make proportionably towards their losses. It also signifies a small duty which those merchants who send goods in another man's ship pay to the master for his care of them, over and above the freight. Hence it is expressed in the bills of lading, paying so much freight for the said goods with primage and average accustomed.

AVERDUPOIS. See AVOIRDUPOIS.

AVE'RMENT. *s.* (from *aver*.) Establishment of any thing by evidence (*Bacon*).

AVE'RNAT. *s.* A sort of grape.

AVERNUS, or AVERNA, a lake of Campania, near Baiæ, whose waters were so unwholesome and putrid, that no birds were seen

on its banks, hence its original name was *αορνος, avibus carens* The ancients made it the entrance of hell (*Virg*) —It may be observed, that all lakes whose stagnated waters were putrid and offensive to the smell, were indiscriminately called Averna

The moral suggested by Virgil's allusion to this lake as the entrance to the infernal regions, seems worth stating here

——Facilis descensus Averni
Sed revocare gradum, superasque evadere ad auras,
Hic labor hoc opus est

"The descent into Avernus is easy, but to recal your steps, and re-ascend to the upper skies, forms the difficulty and the labour The poet speaks of the descent of Æneas into the infernal regions In the general application of the passage, we may say that it is much easier for a man to get into any difficulty or danger, than to extricate himself from it

AVERRHO'A In botany, is a genus of the class and order decandria, pentagynia Calyx five-leaved, petals five expanding above, stamens inserted into a nectariferous ring, alternately shorter, some five-sided five-celled Two species, both of India They received their name from the philosopher, an account of whom is given in the next article

AVERRHOES, or AVERROES, an Arabian philosopher, was a native of Corduba, and flourished in the twelfth century He was instructed in the laws and the religion of the country by his father, who was high priest and chief judge (under the emperor of Morocco) of the kingdom of Corduba, his authority extending over all Andalusia and Valencia Averroes was professor in the university of Morocco, and after the death of his father succeeded to his places, the duties whereof he discharged with great approbation, being eminently skilled in law and divinity He had also studied natural philosophy, medicine, astrology, and mathematics, but understood the theory of medicine much better than the practice The king of Morocco making him an offer of the place of judge of Morocco and Mauritania, with leave to keep those he held at Corduba, he accepted it, went over to Morocco, and having settled judges as his subdelegates, returned to Corduba

He referred all criminal causes to his deputy, never giving his own opinion One Abraham Ibnu Sahal, a philosopher, physician, and astrologer, at Corduba, in an unlucky hour fell in love, and began to write verses, without any regard to his character as a doctor The Jews, his brethren in religion, advising him not to publish them, he returned them a profane answer in verse This obliged them to apply to the civil magistrate They represented to Averroes, that Sahal had debauched the whole city, and especially the youth of both sexes, by his poems, and that nothing else was sung at the marriage feasts Averroes forbad him to write any more, under a penalty, but being afterwards informed that his prohibition could not stop the poetical humour of the Jew, he resolved to be assured of the truth of it, and sent to him a trusty person, who reported at his return, that he found nobody at his house but Averroes's eldest son, writing verses, and that there was neither man, woman, nor child, at Corduba, who had not got by heart Abraham Ibnu Sahal's verses Upon this Averroes dropped the prosecution, saying, "Can one single hand stop a thousand mouths?"

He died at Morocco in 1206 He was excessively fat, though he ate but once a day He spent all his nights in the study of philosophy, and when he was fatigued, amused himself with reading poetry or history Of Averroes's medicinal works himself gives the following account in the preface to them "At the desire of the noble lord Audelach Sempsit, who by the advice of his philosophers, Avosait and Avenchlit, enjoined me to write a book in Arabic, which should contain the whole art of physic, in order to assist them in forming a judgment of the opinions of the ancients, I compiled this work Colliget, that is, universal so entitled on account of the order to be observed in this science, which descends from universals to particulars for in this book I have begun with general rules, and hereafter, with God's assistance, shall undertake another treatise upon particulars, &c He wrote a great many amorous verses, but when he grew old he cast them into the fire His other poems are all lost, except a small piece, in which he declares that when he was young he acted against his reason but that when he was in years he followed the dictates of it upon which he utters this wish, "Would to God I had been born old, and that in my youth I had been in state of perfection

AVERROISTS, a sect of peripatetic philosophers, who appeared in Italy some time before the restoration of learning, and attacked the immortality of the soul They took their denomination from Averroes, and endeavoured to blend some of his whimsies with the pure doctrines of christianity Their principles were condemned by the last council of the Lateran under Leo IX

To AVERRU'NCATE *v a* (*averrunco*, Lat) To root up (*Hudibras*)

AVERRUNCI, in mythology, an order of deities, whose peculiar office it was to avert misfortunes Apollo and Hercules were of this order among the Greeks, and Castor and Pollux among the Latins

AVERSATION *s* (from *aversor*, Latin) Hatred, abhorrence (*South*)

AVE'RSE *a.* (*aversus*, Latin) 1 Malign, not favourable (*Dryden*) 2 Not pleased with, unwilling to (*Prior*)

AVE'RSELY *ad* (from *averse*) 1 Unwillingly 2 Backwardly (*Brown*)

AVE'RSENESS *s* (from *averse*) Unwillingness, backwardness (*Atterbury*)

AVE'RSION *s* (*aversion*, French) 1 Hatred, dislike, detestation (*Milton*) 2 The cause of aversion (*Pope*) Aversion, according to lord Kaimes, is opposed to affection, and

not to desire It is generally considered as synonymous with ANTIPATHY, which see

To A'VERT *v a* (*averto*, Latin) 1 To turn aside, to turn off (*Shakspeare*) 2 To cause to dislike (*Hooker*) 3 To put by, as a calamity (*Sprat*)

AVES, or BIRD'S ISLAND, so called from the vast numbers of fowls of different species upon it It is one of the Caribbees, and lies about 100 miles north of the coast of Terra Firma

AUF *s* (of *alf*, Dutch) A fool, or silly fellow

AUGE'A In botany, a genus of the class and order decandria, monogynia Calyx five-parted corolless, nectary ten-toothed, capsule ten celled The only known species is a native of the Cape

AUGEA, in fabulous history, the daughter of Alœus, who was deflowered by Hercules, became pregnant and brought forth Telephus but when she was delivered, Alœus put both Augea and her son into a chest, and ordered them to be thrown into the river Caycus, when Venus steering the chest, brought it to the mouth of the river, where it was taken up by Teuthras, who falling in love with Augea married her, and afterwards left his kingdom to Telephus

AUGEAS, in fabulous history, king of Elis, particularly famed for his stable which contained three thousand oxen, and had not been cleaned for thirty years Hercules was desired to clear this stable in one day, and Augeas promised, if he performed it, to give him a tenth part of the cattle This task Hercules performed by turning the course of the river Alpheus through the stable when Augeas refusing to abide by his engagement, Hercules slew him with his arrows, and gave his kingdom to Phyleus his son, who abhorred his father insincerity

AUGES, in astronomy, the same as apsides See APSIS

AUGHT *pronoun* (auht, apht, Saxon) Any thing (*Addison*)

AUGIAN M S Codex Augiensis, in biblical history, is a Greek Latin M S of the epistles of St Paul This M S is noted F, in the second part of Wetstein's New Testament It is supposed to have been written in the 9th century, and takes its name from Augia-Major, a monastery at Rheinau, to which it belonged at the time of the council of Basil It is now in the library of Trin Coll Cambridge It is defective from the beginning to Rom iii 8, and the epistle to the Hebrews is found only in the Latin version

AUGIT, a mineral of the chrysolite family, found in basalt, sometimes in grains, but most commonly in crystals, mostly small and complete Colour blackish green, sometimes passing into leek green, and rarely to liver brown Specific gravity 3 22 to 3 47 Before the blow-pipe it is with difficulty converted into a black enamel the constituent parts are

Silica	52 00
Lime	13 20
Alumina	3 33
Magnesia	10 00
Oxide of iron	14 66
——— manganese	2 00
	95 19
Loss	4 81
	100 00

It is found very abundantly in Bohemia, Transylvania, Hungary, Scotland, as at Arthur's Seat, near Edinburgh, and remarkably fine in the island of Rum one of the Hebrides and equally beautiful at Arendal, in Norway See CHRYSOLITE

To AUGMENT *v a* (*augmenter*, Fr) To increase, to make bigger, or more (*Fairfax*)

To AUGME'NT *v n* To increase, to grow bigger (*Dryden*)

A'UGMENT *s* (*augmentum*, Latin) 1 Increase, quantity gained (*Walton*) 2 State of increase (*Wiseman*)

AUGMENT AUGMENTUM, in grammar an accident of certain tenses of Greek verbs, being either the prefixing a syllable, or the increase of the quantity of the initial vowels

AUGMENTATION *s* (from *augment*) 1 The act of increasing or making bigger (*Addison*) 2 The state of being made bigger (*Bentley*) 3 The thing added, by which another is made bigger (*Hooker*)

Court of Augmentation, a court erected in the 27th year of Henry VIII to take care that the revenues of the crown were properly augmented by the estates arising from the suppression of religious houses This court was dissolved in the first year of the reign of queen Mary

AUGMENTATION, in heraldry additional charges to a coat armour, frequently given as particular marks of honour, and generally borne either on the escutcheon or a canton Thus all the baronets of England bear the arms of Ulster in Ireland

AUGMENTATION, in music, a term confined to the language of fuguists, and is the doubling the value of the notes of the subject of a fugue or canon, or, the giving the intervals of the subject in notes of twice the original length

AUGRE, or AWGRE, an instrument used by carpenters and joiners to bore large round holes, and consisting of a wooden handle and an iron blade terminated at bottom with a steel bit

AUGSBURG, or AUSBURG, an imperial city of Germany, situated in a fertile and delightful country, between the rivers Lech and Wertach, which unite not far from it, it is surrounded with ramparts, walls, and ditches It is the see of a bishop, suffragan of the archbishop of Mentz Besides the cathedral, it has six Roman Catholic parish churches and as many Lutheran There are several hospi-

tals, and other charitable foundations the burghers are computed to be six thousand The magistracy consists of forty-five, of whom thirty one are patricians, four related to patricians by marriage, five merchants, and five tradesmen, the council is formed of an equal number of Lutherans and Roman Catholics The trade of Augsburg was once very great, and is now considerable In the diet of the empire, it possesses the second place of the imperial cities of Swabia, and is assessed in the matricula at 507 rix-dollars, twenty kruitzers and a half The bishop is a prince of the empire, and sits and votes in the college of princes, betwixt the bishops of Constance and Hildesheim, his revenue is estimated at 100,000 rix-dollars The territory belonging to the bishopric lies scattered between the rivers Lech, Iler, and Danube The bishop holds his court at Augsburg, but his principal residence is at Dillingen thirty five miles NW Munich Lon 10 58 E Lat 48 21 N

AUGSBURG CONFESSION, denotes a celebrated confession of faith drawn up by Luther and Melancthon, on behalf of themselves and other ancient reformers, and presented in 1530 to the emperor Charles V at the diet of Augusta or Augsburg, in the name of the evangelic body This confession contains 28 chapters, of which the greatest part is employed in representing, with perspicuity and truth, the religious opinions of the protestants, and the rest in pointing out the errors and abuses that occasioned their separation from the church of Rome

AUGUR, an officer among the Romans, appointed to foretel future events by the chattering, flight, and feeding of birds There was a college or community of them consisting originally of nine members, four of whom were patricians and five plebeians

This word is by some derived from avis, bird, and garritus, chattering, whence the original office of the augurs is supposed to have been to observe, and take indications from the noise, calling, singing, chirping and chattering of birds Agreeably to which, augur is commonly distinguished from auspex, as the latter was supposed employed in observing the flight of birds—Pezron derives it from the Celtic au, liver, and gur, man so that according to him an augur was properly a person who inspected the entrails, and divined by means of the liver On which principle, augur would have been the same with aruspices

The augurs were at first chosen by the people divided into curiæ or parishes yet we find that when any one of them died, two of the most ancient chose one of those who studied the science of augury, and presented him to the whole college, who received him after examination, and consulted an augury upon that account to know the will of the gods

Nevertheless we have an example in Titus Livius of an augur chosen by the people, but some say it happened only because there was a contest among the augurs about the election for it is evident that the college had right to choose till the year 651, when Marius being consul the third time, and Lucius Aurelius Orestes, Cn Domitius Ænobarbus, tribune of the people being angry with the augurs, because they did not choose him to that dignity, caused a law to be made called domitia, which gave the right of choosing the augurs, chief-priest, and other priests, to the people of Rome assembled by their tribes, that he might make the greater confusion, and satisfy his own passion the more, as Cicero speaks in his 2d book of the agrarian law

To AUGUR *v n* (from *augur*) To guess, to conjecture by signs (*Dryden*)

AUGURAL, something relating to the augurs

To AUGURATE *v n* (*auguror*, Latin) To judge by augury

AUGURATION *s* (from *augur*) The practice of augury (*Brown*)

AUGURER *s* (from *To augur*) The same with *augur* (*Shakspeare*)

AUGURIAL *a* (from *augury*) Relating to augury (*Brown*)

AUGUROUS *a* (from *augur*) Predicting prescient foreboding (*Chapman*)

AUGURY, in its proper sense the art of foretelling future events by observations taken from the chattering, singing, feeding, and flight, of birds, though it is used by some writers in a more general signification, as comprising all the different kinds of divination Augury was a very ancient superstition When men considered the wonderful migration of birds how they disappeared at once and appeared again at stated times, and could give no guess where they went, it was almost natural to suppose that they retired somewhere out of the sphere of this earth, and perhaps approached the ethereal regions, where they might converse with the gods, and thence be enabled to predict events It was almost natural for a superstitious people to imagine this, at least to believe it, as soon as some impostor was impudent enough to assert it Add to this, that the disposition in some birds to imitate the human voice, must contribute much to the confirmation of such a doctrine Hence these animals were looked upon as the interpreters of the gods, and no affair of consequence, either of private or public concern among the Romans, was undertaken without consulting them

The auguries which were taken from certain appearances in the air were the most considerable and solemn of all others as not being capable to be reiterated the same day, and dissolved assemblies if a magistrate desired to prevent an assembly of the people, or put it off to another time, he would set up in the cross-ways that he observed the signs of the heavens that day, and so it was wholly put off, alio die dixerit

But the senate perceiving the abuse, which that custom had brought in, ordered, that notwithstanding these notices, an assembly

summoned in due form should not desist from sitting.

This sort of augury, which they called augurium de cælo, or, servare de cælo, was taken from extraordinary and sudden signs, which they observed in the heavens.

Now among these signs there were some called bruta, or vana, which foreshewed nothing; others were called fatidica, which portended good or evil; and of these last, some were called consiliara, which happened when they were deliberating about any affair, and seemed to advise it; others auctoritativa, or authoritatis, which came after the thing done, and confirmed or approved it.

Lastly, there were others, called postularia, which obliged to repeat the sacrifices; and other monitoria, which admonished what to avoid.

All times and every day of the year were not proper to take auguries. Plutarch tells us that Metellus, the chief priest, forbid to take auguries after the month of August, because the birds shed their feathers at that time: or in any month of the year immediately after the ides, because the moon then began to decrease; or on any day after noon.

The place on which an augury was taken was a rising ground, and for that reason was called templum, arx or auguraculum, according to Festus. There was a field set apart for it a little distance from Rome, called ager effatus, as Servius upon Virgil observes.

In the great affairs of the commonwealth, they consulted the signs of the heavens; in those of wars, the chattering and flight of birds, and their manner of eating their meat; and for that end they fed poultry in coops, which they called holy pullen, and which they fetched commonly from the island of Lubæa, and he that had the keeping of these poultry was called pullarius, saith Cicero.

The consul gave him notice, who had the care of this poultry to get all things ready to take the sign: then he flung corn to the poultry; if they ate it greedily moving fast with their feet, and crowding about, this was a favourable omen: but if, on the contrary, they refused to eat or drink, it was an unfortunate sign.

This is the form which they used in taking a sign. They always consulted some skilful persons in those sorts of divinations. "Quinte Fabi, te volo mihi in auspicio esse, or in auspiciorum adhibere, dicito si silentium esse videtur: Quintus Fabius, I desire that you would assist me in taking a sign, tell me if all the ceremonies used in the like case have been exactly observed, and if the sign be not defective: he answered, "Silentium esse videtur, nothing is wanting." "Dicito, si pascuntur aves? quæ? aut ubi? attulit in cavea pullos pullarius. Tell me whether the birds eat or no? They eat, and the poultry-keeper hath brought the pullen into the coop."

The veneration for auguries was so strongly imprinted on the minds of the Romans, that they looked upon them as impious persons who contemned or derided them, attributing the misfortunes which happened to Claudius Pulcher to the anger of the gods, who seeing that the poultry would not eat, threw them into the sea, saying in raillery, They'll drink at least, if they will not eat.

There was a college of 300 augurs, at Lyons.

AU'GUST, in chronology, the eighth month of our year, containing 31 days. August was dedicated to the honour of Augustus Cæsar, because, in the same month, he was created consul, thrice triumphed in Rome, subdued Egypt to the Roman empire, and terminated the civil wars.

AUGU'ST, AUGU'STUS. *a.* In a general sense, great, grand, majestic, venerable, or sacred. The title Augustus was first given by the Roman senate to Octavius, on Jan. 13th, A. U. C. 727. B. C. 27. This title, which was expressive of the character of peace and sanctity, was a personal, and Cæsar a family distinction.

AUGUSTA, the capital of Georgia, in North America, is situated in a fine plain on the S. W. bank of the Savannah. It does not consist of more than 300 houses, but is rising in importance. Lat. 33. 20. N. Lon. 82. 0. W.

AUGUSTA AUSCIORUM, a town of Aquitania, so named out of compliment to Augustus, being originally called Climberrum, which name it afterwards resumed. In the middle age it took the name of the people, Ausci, and is now called Auch, the capital of Gascony.

AUGUSTA EMERITA, a town of Lusitania on the river Anas, the capital of the province: a colony of the Emeriti, or such soldiers as had served out their legal time, were men of experience, or had received marks of favour. The colony was founded by Augustus, and is now called Merida, a city of Spain in Estremadura, on the river Guadiana. See MERIDAN.

AUGUSTA HISTORIA, is the history of the Roman emperors from the time of Adrian to Carinus, that is, from the year of our Lord 117 to 285: composed by six Latin writers, Ælius Spartianus, Julius Capitolinus, Ælius Lampridius, Vulcatius Gallicanus, Trebellius Pollio, and Flavius Vopiscus.

AUGUSTA TAURINORUM, a town of the Taurini at the foot of the Alps, where the Duria Minor falls into the Po, now Turin, the capital of Piedmont.

AUGUSTALES, in Roman antiquity, an epithet given to the flamens or priests appointed to sacrifice to Augustus after his deification, and also to the ludi or games celebrated in honour of the same prince on the fourth of the ides of October.

AUGUSTALIA, a festival instituted by the Romans in honour of Augustus Cæsar, on his return to Rome, after having settled peace in Sicily, Greece, Syria, Asia, and Parthia.

AUGUSTAN, relating to Augustus. As Augustan age, the age or time in which Augustus flourished. The reign of queen Anne is often called the Augustan age of England.

AUGUSTAN CONFESSION See AUGSBURG CONFESSION

AUGUSTE, or AUSTA, an island in the Adriatic sea, subject to Venice Lat 42 55 N Lon 17 0 E

AUGUSTINE (St), an eminent father of the church, was born at Tagaste, in Africa, in 354 His father was a plebeian, and his mother, Monica, was a woman of exemplary piety Though he had all the advantage of a good education, he squandered away his time in idleness and debauchery In 371 his father sent him to Carthage, where, though he still continued addicted to pleasure, he did not entirely neglect his studies Here he became a convert to the manichees, and continued a zealot in that way for about ten year In 380 he taught rhetoric at Carthage with great reputation, but he still continued his licentious course of life, and kept a woman publicly, by whom he had a son, named Adeodatus His good mother took uncommon pains to bring him back to virtue and orthodoxy but finding all her endeavours ineffectual, she had recourse only to hope and prayer on his behalf Wearied with his situation in Africa, Augustine removed to Rome, where he taught rhetoric with great applause, and in 383 he was appointed professor of rhetoric at Milan Here the sermons of Ambrose, the bishop, made him stagger, and at length he totally renounced his heretical notions, and was baptized by the good bishop in 387 The next year he returned to Africa, was ordained priest in 391, and in 395 was chosen coadjutor to Valerius, the bishop of Hippo, and on his death he had the sole charge of that see He died in 430 His writings have been always held in the profoundest veneration by the catholic church, and from them was formed that system which is commonly called scholastic divinity The best edition of his works is that of Paris, in 10 vols folio, published in 1679 and 1690

AUGUSTIN (St), the chief town of East Florida Lat 30 10 N Lon 81 10 W

AUGUSTINS, or AUGUSTINIANS, an order of religious, thus called from St Augustin, whose rule they observe The Augustins, popularly also called Austin friars, were originally hermits whom pope Alexander IV first congregated into one body, under their general Lanfranc, in 1256 Soon after their institution this order was brought into England, where they had about thirty two houses at the time of their suppression The Augustins are clothed in black, and make one of the four orders of mendicants From these arose a reform, under the denomination of bare foot Augustins, or Minorests or Friars minor There are also canons regular of St Augustin, who are clothed in white, excepting their cope, which is black Before the French revolution, they were known at Paris under the denomination of [illegible] of Genevieve, that abbey being the [illegible] of the order There are also nuns and [illegible], who observe the rules of St Augustin

AUGUSTINIANS are also those divines who maintain, on the authority of St Augustin, that grace is effectual from its nature, absolutely and morally, and not relatively and gradually They are divided into rigid and relaxed

AUGUSTNESS s (from *august*) Elevation of look, dignity

AUGUSTUS (Caius Julius Cæsar Octavianus), was the son of Caius Octavius, by Attia, the niece of Julius Cæsar He was born in the year 62 B C and having received a liberal education, was adopted by Julius Cæsar He was at Apollonia in Epirus when his uncle was assassinated, and, on receiving the news, he instantly set out for Rome, where he found two parties contending with each other, the republicans and the followers of Antony and Lepidus Octavianus was treated with great respect by the magistrates and principal citizens, but Antony treated him with haughty contempt When Antony was proscribed, he joined the army that was sent against him but afterwards he thought it prudent to enter into a treaty with that commander, and these two leaders, together with Lepidus formed the famous triumvirate, by which they agreed to enjoy an equal portion of authority for five years Soon after this Octavianus ratified the malicious spirit of his associates, by sacrificing his old and excellent friend Cicero and, in short, the triumvirs filled Rome with the blood of its best citizens On the death of Brutus at Philippi, another partition took place, Antony and Octavianus sharing the Roman empire, and Lepidus taking to himself the provinces in Africa Octavianus obtained Rome and gave his sister, Octavia in marriage to Antony At length Lepidus was deposed, and a difference broke out between Antony and Octavianus, which ended in the destruction of the former, and the establishment of the latter in that station, which seems constantly to have been his aim In the 36th year of his age and B C 27 the senate gave him the new title of Augustus with all the power and authority of emperor The senate paid him a flattering compliment in changing the name of the month Sextilis in which he came to the consulate to August After attaining the imperial dignity, he seems to have corrected his eager temper, and to have conducted himself with moderation, and the sanguinary Octavianus was forgotten in the mild Augustus He made some good regulations in the government, reducing the number of the senators from 1000 to 600, and raising the degree of wealth which was to qualify them for that dignity He also set about reforming the public morals Augustus carried his arms with success into Gaul, Germany and the East, but in the latter part of his life the Romans suffered some severe losses in Germany He died at Rome A D 14 and in the 76th year of his age He certainly improved Rome considerably, and might say with justice, ' that he had found it brick, but left it marble ' He was, moreover a great encourager of men of letters so that his reign was called the Augustan age The empire came to his successor, Tiberius, in a flourishing

state, and every part of the government was in excellent order (*Watkins*)

AU GUY-L AN-NEUF, or AUGILAN-NEUF. See MISLETO

AVIARY s (from *avis*, Lat) A place enclosed to keep birds in (*Evelyn*)

AVICENNA an Arabian physician, was born in 980 After receiving a liberal education, he applied to the study of physic, in which he attained great eminence At the age of 18 he began to practise, and with such success, that he became physician to the court of Bagdat At last he fell under the displeasure of the prince in whose service he was engaged, and was thrown into prison, where he died, in 1036 He left a number of works which were printed in Arabic at Rome in 1480, and since in Latin, in various other places The titles of his extra works are as follow 1 Of the Utility and advantage of the Sciences in 20 books —2 Of Innocence and Criminality, 2 books —3 Of Health and Remedies, 18 books —4 On the Means of preserving Health 3 books —5 Canon of Physic, 14 books —6 On Astronomical Observations, 1 book —7 On Mathematical Sciences —8 Of Theorems, or Mathematical and Theological Demonstrations 1 book —9 On the Arabic Language and its Properties 10 books —10 On the Last Judgment —11 On the Origin of the Soul and the Resurrection of Bodies —12 On the End we should propose to ourselves in Harangues and Philosophical Argumentations —13 Demonstration of the Collateral Lines in the Sphere —14 Abridgment of Euclid —15 On Finity and Infinity —16 On Physics and Metaphysics —17 On Animals and Vegetables &c —18 Encyclopedia 20 volumes

The celebrity of this author seems to rest more upon the number than upon the value of his production "One would naturally expect says Freind, (Hist of Physic vol ii p 73) to find in this author something answerable to the fame he acquired but though I have very often looked into his writings upon several occasions, I could meet with little or nothing there, but what is taken from Galen or what at least occurs with very little variation in Rhazes or Haly Abbas

AVICENNIA In botany a genus of the class didynamia angiospermia Calyx five parted corol two lipped the upper lip square, capsule coriaceous rhomboid one seed Three species India New Zealand, Martinique Of these, one tomentosa is the plant which affords the ... of the pharmacopœia See ANACARDIUM ORIENTALE

AVIDITY s (*avidité* Fr) Greediness, eagerness, appetite insatiable desire

AVIGATO or ALLIGATOR PEAR This delicious fruit, the produce of the laurus persea of Linnéus, when ripe melts in the mouth like marrow, which it greatly resembles in flavour It is supposed to be the most nutritious of all the tropical fruits and grows in vast abundance in the West Indies and New Spain The unripe fruit has but little taste, yet being very salubrious is often eaten with salt and pepper The sailors, when they arrive at the Havannah and those parts, purchase these pears in great quantities, and chopping them into small pieces with green capsicums and a little salt, regale themselves heartily with them They are esteemed also for their antidysenteric qualities, and are prepared in a variety of ways for the tables of the rich See LAURUS

AVIGNON, a city of France, in the department of Vaucluse, lately dependent on the pope with an archbishop's see, and a university Lat 43 57 N Lon 4 53 E This is the ancient Avenio

AVIGNON BERRY, called also French berry, is the fruit of a shrub by some authors named lycium, growing plentifully near Avignon, and in other parts of France

AVILLA an ancient city of Old Castile in Spain, it is seated on a large plain, surrounded with mountains Here is a good manufacture of fine cloth Lat 40 40 N Lon 4 ... W

AVIS bird Aves, birds, are ... the second class of animals, a race of creatures sufficiently distinguished from the others in having the body covered with feathers, two feet and two wings formed for flight In the Linnean system, birds are divided into six orders, viz accipitres, picæ, anseres, grallæ, gallinæ and passeres See ORNITHOLOGY

AVITOUS a (*avitus*, Lat) Left by a man's ancestors, ancient

To AVIZE v a (*aviser*, French) 1 To counsel (*Spenser*) 2 To bethink himself (*Spenser*) 3 To consider (*Spenser*)

AUKLAND, or BISHOP'S AUKLAND, a town of Durham, having a market on Thursdays It is 251 miles N W of London

AULA, is used for a court baron by Spelman by some old ecclesiastical writers for the nave of a church, and sometimes for a court-yard

AULA REGIA, or REGIS a formidable tribunal established by William the conqueror, in his own hall, which received appeal from all the courts of the barons and decided in the last resort on the estates, honours and lives of the barons themselves It was wholly composed of the great officers of the crown, removeable at the king's pleasure, and, having the king for president, it held the first problem in in the kingdom under this same control a the meanest subject This court underwent some regulations by the passing of the Great Charter

AULCESTER a ... town of Warwickshire having a market on Tuesdays Lat 52 16 N Lon 1 ... W

AULD a (Ald Saxon) Old (*Shakspeare*)

AULETES, in antiquity, a flute-player

AULETICK a (αυλος) Belonging to pipes

AULIC, an epithet given to certain officers of the empire, who compose a court, which decide without appeal in all processes entered in it Thus we say aulic council, aulic chamber, aulic counsellor The aulic council is composed of a president, who is a catholic, of a vice chan-

cellor, presented by the archbishop of Mentz, and of eighteen counsellors, nine of whom are protestants, and nine catholics They are divided into a bench of lawyers, and always follow the emperor's court, for which reason they are called justitium imperatoris, the emperor's justice and aulic council

AULICK *a* (*aulicus*, Latin) Belonging to the court

AULN *s* (*aulne* Fr) A French measure of length, an ell

AULUS GELLIUS, in biography, a Roman grammarian and critic flourished at Rome in the second century He studied grammar and rhetoric at Rome, and philosophy at Athens, where he enjoyed the society of Calvisius Taurus, Peregrinus Proteus Herodes Atticus and other learned persons His "Noctes Atticæ, or Attic Nights, was edited in folio at Rome, in 1469, by Levenheim and Pannartz There is likewise a valuable quarto edition by Gronovius, published at Amsterdam, in 1706 An elegant translation, with curious notes was published in 3 vols 8vo by Mr Beloe, in 1795

To AUMAIL *v a* (from *maille*, Fr) To variegate to figure (*Spenser*)

AUNCEL-WEIGHT an ancient kind of balance now out of use, being prohibited by several statutes, on account of the many deceits practised by it It consisted of scales hanging on hooks fastened at each end of a beam which a man lifted up on his hand In many parts of England aunced weight signifies meat sold by the hand without scales

AUNE See AULN

AUNT *s* (*tante*, Fr) A father or mother's sister (*Pope*)

AVOCADO or ALLIGATOR PEAR See LAURUS

To A'VOCATE *v a* (*avoco* Lat) To call off from business to call away

AVOCA'TION *s* (from *avocate*) 1 The act of calling aside (*Dryden*) 2 The business that calls (*Hale*)

To AVO'ID *v a* (*vuider*, French) 1 To shun, to decline (*Tillotson*) 2 To endeavour to shun to shift off (*Shakspeare*) 3 To evacuate, to quit (*Bacon*) 4 To emit, to throw out (*Brown*) 5 To oppose, to hinder effect (*Bacon*)

To AVO'ID *v n* 1 To retire (1 *Sam*) 2 To become void or vacant (*Ayliffe*)

AVO'IDABLE *a* (from *avoid*) 1 That may be avoided or shunned (*Locke*) 2 Liable to be vacated or annulled (*Hale*)

AVO'IDANCE *s* (from *avoid*) 1 The act of avoiding (*Watts*) 2 The course by which any thing is carried off (*Bacon*)

AVOIDANCE, in canon law, is when a benefice becomes void of an incumbent which happens either in fact, as by the death of the parson, or in law, as by cession, deprivation, resignation, &c In the first of these cases, the patron must take notice of the avoidance, at his peril but in avoidance by law, the ordinary is obliged to give notice to the patron, in order to prevent a lapse

AVO'IDER *s* (from *avoid*) 1 The person that shuns any thing 2 The person that carries any thing away 3 The vessel in which things are carried away

AVO'IDLESS *a* (from *avoid*) Inevitable, that cannot be avoided (*Dennis*)

AVOIRDUPOIS WEIGHT, a weight used in England for weighing all the larger and coarser sorts of goods, as groceries cheese, butter, flesh, wool, salt, hops &c and all metals except gold and silver Avoirdupois weight is thus divided, viz

16 dr or drams make	1 ounce, marked		*oz*
16 oz	- -	1 pound, -	*lb*
112 lb	- -	1 hundred weight,	*cwt*
20 cwt	- -	1 [illegible] - -	*ton*

The avoirdupois ounce is less than the troy ounce, in the proportion of 7 0 to 768, but the avoirdupois pound greater than the troy pound in the proportion of 700 to 576

for 1 lb avoird is = 7000 grains troy,
but 1 lb troy is = 5760 grains troy,
also 1 oz avoird is = 437½ grains troy,
and 1 oz troy is = 480 grains troy

The first statute that directs the use of the avoirdupois weight is that of 24 Henry VIII which plainly implies it was no legal weight till sanctioned by that statute, the particular use to which the said weight is thus directed, is simply for weighing butchers meat in the market After this it gradually grew into general use, for weighing such goods as are very coarse and drossy, or subject to waste

AVOLA'TION *s* (from *avolo* L) The act of flying away, flight (*Brown*)

AVON, a river which rises in Wiltshire and passes through Salisbury a little below which it begins to be navigable, it continues its course to Bristol and falls into the Severn a few miles N W of that city

AVON, a river which rises in Leicestershire and running S W by Warwick, continues its course by Evesham and falls into the Severn at Tewkesbury, in Gloucestershire

AVORFT See RECURVIROSTRA

To AVO'UCH *v a* (*avouer*, French) 1 To affirm, to maintain (*Hooker*) 2 To produce in favour of another (*Spenser*) 3 To vindicate, to justify (*Shakspeare*)

AVO'UCH *s* (from the verb) Declaration, evidence testimony (*Shakspeare*)

AVO'UCHABLE *a* (from *avouch*) That may be avouched

AVO'UCHER *s* (from *avouch*) He that avouches

To AVO'W *v a* (*avouer* Fr) To declare with confidence to justify (*Swift*)

AVO'WABLE *a* (from *avow*) That may be openly declared

AVO'WAL *s* (from *avow*) Justificatory declaration open declaration

AVO'WEDLY *ad* (from *avow*) In an open manner (*Clarendon*)

AVOWEE' *s* (*avoue* Fr) He to whom the right of advowson of any church belongs

AVO'WER *s* (from *avow*) He that avows or justifies (*Dryden*)

AVOWRY, in law, is where a person dis-

strained sues out a replevin, for then the distrainer must vow, and justify his plea, which called his avowry

AVOWSAL, s (from *avow*) A Confession

AVOWTRY, s (See ADVOWTRY) Adultery

AVOYER, in ecclesiastical antiquity, the advocate of a monastery

AURA (*aura*, αυρα, from αω, *to breathe*, or rather from אור *aur*, Heb light ether, or any other exquisitely attenuated gas) Any subtle vapour or exhalation

AURA, in chemistry, a name anciently employed to denote a substance nearly similar to spiritus rector, or aroma

AURÆ, in mythology, a name given by the Romans to the nymphs of the air They are mostly to be found in the ancient paintings of ceilings where they are represented as light and airy, generally with long robes and flying veils of some lively colour or other, and fluttering about in the rare and pleasing element assigned to them

AURA EPILEPTICA A sensation which is felt by epileptic patients, as if a blast of cold air ascended from the lower parts towards the heart and head

AURA SEMINIS In old and perhaps erroneous physiology, the extremely subtle and vivifying portion of the semen virile that ascends through the Fallopian tubes, to impregnate the ovum in the ovarium

AVRANCHES, an ancient town of France, the department of the Channel and late province of Normandy Lat 48 41 N Lon 1 18 W

AURANGIUM See AURANTIUM

AURANTIA CORTEX, in pharmacy Orange peel

AURANTIUM, (*aurantium*, ab aureo colore, from its golden colour) Aurantium hispalense The Seville orange The plant which affords this fruit is the citrus aurantium, petiolis alatis, foliis acuminatis, of Linneus Class polyadelphia Order icosandria The leaves, flowers, and exterior rind are directed for medicinal use The latter possesses stomachic and stimulant qualities, and is ordered in tinctures, conserves, and syrups the leaves and flowers are very seldom used See CITRUS

AUREA ALEXANDRINA in pharmacy, a kind of opiate, or antidote against the cholic and apoplexy, composed of a great number of ingredients, which was in great fame among the ancient writers It is called aurea from the gold (aurum) which is an ingredient in its composition, and alexandrina, as having been invented by a physician named Alexander

AURELIA The chrysalis or quiescent stage of transformation in an insect, in which it is inclosed in a hard case or web

AURELIAN emperor of Rome after Flavius Claudius, was austere, and even cruel in the execution of the laws, and punished his soldiers with uncommon severity He rendered himself famous for his military character, and his expedition against Zenobia, the celebrated queen of Palmyra, gained him great honours He beautified Rome, was charitable to the poor, and the author of many salutary laws He was naturally brave, and in all the battles he fought, it is said he killed no less than 800 men with his own hand In his triumph, he exhibited to the Romans people of 15 different nations, all of which he had conquered He was the first emperor who wore a diadem After a glorious reign of six years, as he marched against the northern barbarians, he was assassinated near Byzantium, A D 275 29th January, by his soldiers, whom Mnestheus had incited to rebellion against their emperor

As to the general character of Aurelian, it has been remarked by Dioclesian, that his talents were better suited to the command of an army than to the government of an empire His temper was haughty and vindictive, and he was extremely impatient under restraint or contradiction He has been classed among the persecutors of the christian church, his persecution being reckoned by Augustine, the ninth Mosheim however, is of opinion that many Christians did not suffer at this time, but considering Aurelian's cruel temper, and how much he was addicted to the Gentile superstitions, he thinks that if he had lived, his persecutions would have exceeded all the former ones in severity

AURENGABAD, a city in the East Indies, capital of the province of Balagate Lat 20 10 N Lon 76 50 E

AUREOLA, in its original signification, denotes a jewel which is proposed as a reward of victory in some public dispute Hence the Roman schoolmen applied it to denote the reward bestowed on martyrs, virgins, and doctors, on account of their works of supererogation, and painters use it to signify the crown of glory with which they adorn the heads of saints, confesssors &c

AUREUS, a Roman gold coin, equal in value to twenty-five denarii According to Ainsworth, the aureus of the higher empire weighed near five pennyweights, and in the lower empire little more than half that weight

AUREUS, in zoology, the species of canis usually called the jackal

AURICHALCUM, a corruption of ORICHALCUM, which see

AURICLE, AURICULA, in anatomy, the external ear, or that part of the ear which is prominent from the head The word is a diminutive of *auris*, ear, little ear For the structure and variety of the auricle, with the several parts thereof, their names &c see EAR

AURICLE is also applied to two appendages of the heart, being two muscular caps, covering the two ventricles thereof, thus called from the resemblance they bear to the external ear See ANATOMY and HEART

AURICOLA (from *aurum*, gold, and κολλαω, *to glue together*, a barbarous and unclassical term as compounded of two languages) Borax a substance with which goldsmiths solder gold. Chrysocolla

AURICULA, (*auricula*, dim of auris, the ear) The external ear, upon which are several

eminences and depressions, as the helix, antihelix, tragus, antitragus, concha auricula, scapha, and lobulus

Auricula judæ Fungus sambucinus A membraneous fungus, the peziza auricula, concava rugosa auriformis, of Linneus, which resembles the human ear Its virtues are adstringent, and it is generally employed in form of decoction, as a gargle for relaxed sore throats

Auricula muris See Pilosella

Auricula, borage leaved See Verbascum

AURICULAR a (from auricula L t) 1 Within the sense or reach of hearing (*Shakspeare*) 2 Secret, told in the ear 3 Traditional, known by report (*Bacon*)

AURICULARIS, (auricularis, digitus, from auris, the ear) The little finger so called because people generally put it into the ear, when the hearing is obstructed

AURICULATE See Labiid

AURICULARLY ad (from auricular) In a secret manner (*Decay of Piety*)

AURIFEROUS a (aurifer, Latin) That produces gold (*Thomson*)

AURIFLAMMA, in the French history a standard belonging to the abbey of St Dennis, suspended over the tomb of that saint, which the religious, on occasion of any war in defence of their lands or rights, took down with great ceremony, and gave it to their protector or advocate, to be borne at the head of their forces Hence the word is sometimes used to denote the chief flag or standard of an army

AURIGA, the waggoner, in astronomy, a constellation of the northern hemisphere, it contains, according to the best accounts, 40 stars of the first six magnitudes, namely 1 1 1 9 9 25 arranged according to their magnitude

AURIGARII, AURIGÆ, AURIGATORES Coachmen, who in the public plays of the Cirque disputed with the competitors, with whom they contended in driving the chariots for the prizes which were proposed They made up certain societies, distinguished by colours, of which we read the four principal in Gruter's Inscriptions, viz *Russatam*, the red *Prasinam*, the green *Venetam*, the blue, and *Albatam*, the white The ancients thought that the four seasons of the year were represented by them

AURIGATION s (auriga Latin) The act or practice of driving carriages

AURIPIGMENTUM Yellow orpiment See Arsenic

AURIS, (auris, from aura, air, as being the medium of hearing) The ear, or organ of hearing See Ear

AURISCALP, (auriscalpium, from auris, the ear and *scalpo*, to scrape) An instrument for cleansing the ear

AURITÆ, in ancient history, the denomination of a large body of adventurers who migrated into Egypt at a very early period Manetho supposes them to have been Arabians, but the learned Bryant maintains that they were Arkites, who had been expelled from Babylon by the sons of Shem, at the second dispersion

AURORA, in fabulous history, the daughter of Hyperion and Thea The poets have feigned her to be the day break, which gives notice of the approach of the sun thus, by the poets has been represented in the most beautiful manner, particularly by Homer and Virgil, who represented Aurora as rising out of the ocean in a saffron-coloured robe, and seated in a flame coloured chariot, drawn by two or four horses with her rosy fingers opening the gates of light and scattering the pearly dew The goddess is said to have been enamoured with a beautiful youth named Cephalus, who is supposed to be the same with the Sun, and by whom she had Phaeton, her greatest favourite however was Tithonus, by whom she had Æmathion and Memnon, she had also an amour with Orion, though Astræus was her husband, who was one of the Titans, and by whom she had the stars, and the four winds, Zephyrus Argestes, Boreas, and Notus

Aurora also signifies, the morning twilight, or that faint light which appears in the morning when the sun is within 18 degrees of the horizon

Aurora borealis, Northern light, or Streamers, a kind of meteor appearing in the northern part of the heavens, mostly in the winter and in frosty weather It is usually of a reddish colour, inclining to yellow, and sends out frequent coruscations of pale light which seem to rise from the horizon in a pyramidal undulating form and shooting with great velocity up to the zenith It appears often in form of an arch which is partly bright, and partly dull, but generally transparent And the matter of it is not found to have any effect on the rays of light which pass freely through it This curious phenomenon has been regarded by poets as well as philosophers and Thomson has described it with much beauty and accuracy in his Seasons

> "Silent from the north,
> A blaze of meteors shoots ensweeping first
> The lower skies, they all at once converge
> High to the crown of Heaven, and all at once
> Relapsing quick, as quickly reascend
> And mix and thwart, extinguish and renew,
> All æther coursing in a maze of light"

This kind of meteor never appears near the equator, and it is observed in England, that none are recorded in our annals since that remarkable one, Nov 14, 1574, till the surprising aurora borealis, March 6, 1716, which appeared for three nights successively, but by far more strongly on the first —Indeed in the years 1707, and 1708, five small ones were observed in little more than eighteen months

Father Boscovich has determined the height of an aurora borealis, observed on the 16th of December 1737, by the marquis of Poleni, to have been 825 miles and Mr Bergman from a mean of thirty computations makes the average height of the aurora borealis to be 72 Swedish or (supposing a Swedish mile to be about 6½ English miles) 468 English miles.

Euler supposes the height to be several thousands of miles, and Mairan also assigns to these phenomena a very elevated region, the far greater number of them being, according to him, about 200 leagues above the surface of the earth. Dr Blagden, speaking of the height of some fiery meteors (Phil Trans vol lxxiv p 227) says that "the aurora borealis appears to occupy as high, if not a higher region, above the surface of the earth, as may be judged from the very distant countries to which it has been visible at the same time," he adds, that "the great accumulation of electric matter seems to lie beyond the verge of our atmosphere as estimated by the cessation of twilight However the height of these meteors, none of which appear to have ascended so high as 100 miles, is trivial, compared with the elevations above ascribed to the aurora borealis But as it is difficult to make such observations on this phenomenon as are sufficient to afford a just estimate of its altitude, they must be subject to considerable variation and to material error

This kind of meteor is, in the polar regions, almost constant during the winter and appears with great lustre In the Shetland Isles the "merry dancers," as they are there called, are the constant attendants of clear evenings, and afford great relief amidst the gloom of the long winter nights

In the northern latitudes of Sweden and Lapland the aurora borealis are not only singularly beautiful in their appearance, but, by their almost constant effulgence, afford travellers a very beautiful light during the whole night In Hudson's Bay the aurora borealis diffuses a variegated splendour, which is said to equal that of the full moon In the north-eastern parts of Siberia, according to the description of Gmelin, these northern lights are observed to begin with single bright pillars, rising in the north, and almost at the same time in the north east, which gradually increasing comprehend a large space of the heavens, rush about from place to place with incredible velocity, and finally almost cover the whole sky up to the zenith, and produce an appearance as if a vast tent were expanded in the heavens glittering with gold rubies, and sapphire The illumination is attended with a hissing and crackling noise through the air as though the largest fire works were playing off Similar lights, called aurora australes, have been long since observed towards the south pole (See Phil Trans No 461, &c), and their existence has been more lately ascertained by Mr Forster, who assures us that, in his voyage round the world with captain Cook, he observed them in high southern latitudes

Many attempts have been made to determine the cause of this phenomenon Dr Halley imagines that the watery vapours or effluvia, exceedingly rarefied by subterraneous fire, and tinged with sulphureous streams, which many naturalists have supposed to be the cause of earthquakes, may also be the cause of this appearance, or that it is produced by a kind of subtle matter freely pervading the pores of the earth, and which, entering into it nearer the southern pole, passes out again with some force into the æther, at the same distance from the northern This subtle matter by becoming more dense, or having its velocity increased, may perhaps be capable of producing a small degree of light, after the manner of effluvia from electric bodies, which, by a strong and quick friction, emit light in the dark, to which sort of light this seems to have a great affinity Philos Trans No 347 See also Mr Cotes's description of this phenomenon, and his method of explaining it by streams emitted from the heterogeneous and fermenting vapours of the atmosphere in Smith's Optics, p 69

Mr Canton, soon after he had obtained electricity from the clouds, offered a conjecture that the aurora is occasioned by the dashing of electric fire positive towards negative clouds at a great distance, through the upper part of the atmosphere, where the resistance is least and he supposes that the aurora which happens at the time when the magnetic needle is disturbed by the heat of the earth is the electricity of the heated air above it and this appears chiefly in the northern regions, as the alteration in the heat of the air in those parts is the greatest

Sig Beccaria conjectures that there is a constant and regular circulation of the electric fluid from north to south, and he thinks that the aurora borealis may be this electric matter performing its circulation in such a state of the atmosphere as renders it visible, or approaching nearer than usual to the earth though probably this is not the mode of its operation, as the meteor is observed in the southern hemisphere with the same appearances as in the northern Dr Franklin supposes that the electric fire discharged into the polar regions, from many leagues of vaporised air raised from the ocean between the tropics, accounts for the aurora borealis and that it appears first where it is first in motion, namely in the most northern part, and the appearance proceeds southward, though the fire really moves northward Franklin's Exper and Obs 1769, p 49 Philos Trans vol lviii p 358, 784, Ib vol li p 403, Lettere dell Ellettricismo, p 269, or Priestley's Hist of Electricity

M Libes has suggested a new theory in his Nouv Dict de Physique, which is adopted by most of the northern philosophers In Libes's opinion electrical light is not the cause of the auroræ boreales, nor has electricity itself any farther influence upon their existence than as it fixes the aeriform substances whose combination occasions the meteor This philosopher's theory is founded upon the following principles

1 If we excite the electric spark in a mixture of azotic and oxygen gas, there will result nitric acid, nitrous acid, or nitrous gas, according to the relation that subsists between the gases which compose the mixture

2 Nitric acid, when exposed to the sun, assumes more colour and volatility Scheele first observed this phenomenon Libes placed a receiver over a salver containing nitric acid and exposed to the action of the solar rays

Some minutes after, the acid appeared coloured, and the receiver filled with red and volatile vapours, which were sustained in it a long while, and diffused a light similar to that of the auro a borealis

3 In flasks which contain nitrous acid, a ruddy and volatile vapour is always perceived above the vapour

4 Nitrous gas, in contact with atmospheric air, exhales ruddy vapours, which fly off into the atmosphere

5 The hydrogen, which is disengaged from the surface of the globe, rises till it occupies in the higher regions of the atmosphere a place determined by its specific gravity

6 The solar heat has very little activity in the polar regions

These several principles rest upon observations and experiment made with the greatest exactness, and most of them too well known to need being described here Now it is manifest from a simple combination of these facts 1st That the production of hydrogen must be almost nothing in the polar regions 2dly That the higher regions of the polar atmosphere contain very little if any hydrogen 3dly That whenever there is a re establishment of equilibrium of the electric fluid in the polar atmosphere, this fluid can only find in its passage a mixture of azot and oxygen 4thly That the electric spark ought to fix and combine these gaseous substances 5thly That from this combination must result a production of nitrous acid, of nitric acid, or of nitrous gas, according to the relation subsisting between the oxygen and azot that constitute the mixture 6thly That the production of either of these acids, or of the gas, will give birth to red and volatile vapours, whose elevation in the atmosphere will form the meteor known under the name of the auror a borealis

After removing some general objections to these preliminary notions, M Libes applies them to the phenomena, as below

1st *Phenomenon* The auroræ boreales are sometimes accompanied by slight detonations

In the polar regions, the production of hydrogen is next to nothing, by reason of the little activity of the solar heat It is nevertheless true, that in summer the long duration of the sun above the horizon causes even there a heat sufficiently considerable to produce the disengagement of some small portion of hydrogen, which will rise up to the higher regions of the atmosphere whence it results, that if the re establishment of equilibrium of the electric fluid takes place in the polar atmosphere, when its superior strata contain this gaseous substance the electric spark must exert upon it a part of its activity, and produce slight detonations

2d *Phenomenon* The major part of auroræ boreales appear to move from the north towards the south, though some are seen whose motion is directed towards the east or west

The nitric acid, nitrous acid, and nitrous gas, which give birth to auroræ boreales, have their origin towards the poles These substances exhale ruddy vapours, which, as they rise in the atmosphere, must direct their motion towards the place where they meet with least resistance, which is, of course, towards the south, where the air, always less dense than about the north, offers them a more free and easy passage It may also happen that at the same time these ruddy vapours are formed, a northerly wind may blow in the upper region of the atmosphere, and thus give them a strong impulsion which, combined with the preceding general tendency southward, may cause the resulting motion to be sometimes southward, at others eastward, or westward

3d *Phenomenon* The auroræ boreales sometimes exhibit themselves under the form of luminous columns having different figures and different directions Some are cylindrical, others pyramidal, others are curved in the shape of an arc When they are impelled with much activity, they proceed to the zenith of the spectator Those whose motion is still more rapid, go on beyond the zenith sometimes even till they reach the southern horizon They do not always rise directly from the centre of the cloudy part towards the zenith, but sometimes take a lateral direction, especially when the cloud from whence they spring is found suspended between the north and the east or west

When the re establishment of equilibrium of the electric fluid fixes and combines a great quantity of azote and oxygen the ruddy vapours resulting from this combination must occupy a large space in the atmosphere These vapours being of such considerable extent, and impelled from north to south must sometimes separate from one another, the different portions receiving various directions, thus they will be carried sometimes perpendicularly, at others parallel to the horizon, at others parallel to the earth s axis, whence it follows that the aurora borealis must sometimes appear to the observer in the form of columns whose number figure, and direction, are determined by circumstances It may also sometimes happen that these luminous columns remain for a time immoveable, with respect to the horizon This ought to be the case whenever a wind impels the luminous cloud towards any part whatever from the south, with the same force as the exhalations are impelled towards it by a contrary wind

4th *Phenomenon* The auroræ boreales do not all shine with an equally vivid lustre, some have a mild and tranquil light, others shine with a very resplendent brilliancy

The vapours which are disengaged from nitric acid exposed to the solar rays, diffuse a mild light of a clear red, verging towards yellow, those which are perceived above them, from nitrous acid, are of a deep red; those exhaled from the nitrous gas, in contact with the atmospheric air, are at first of a pretty deep red, which afterwards become more and more clear and light, as these vapours extend themselves more in the atmosphere The luminous columns, therefore, presented by the aurora

borealis, have different colours, according as the ruddy vapours take their rise from the formation of the nitric acid, of the nitrous acid, or of the nitrous gas Retrospect of Philosophic, &c Discoveries, No 8

Our ingenious countryman, Mr Dalton, is of opinion that the aurora borealis is a magnetic phenomenon, the beams being governed by the earth's magnetism See his Meteorological Essays, or Gregory's Astron and Philos Lessons

AURORA ISLAND, one of the New Hebrides, in the South Pacific Ocean, about twenty leagues in circumference, with a small bay on the north west coast, with plenty of fresh water and wood Lon 168 12 E Greenwich Lat 15 8 S

AURUM Gold A metal of a reddish-yellow colour, not tarnished by the air, softish and very tenacious not sonorous, exceedingly malleable and ductile specific gravity 19 300 burning in a red heat with a sea-green light, and melting at a white heat soluble only in nitro muriatic acid, and giving the solution a yellow colour, when melted with borax producing a ruby coloured glass Twelve species, the following are the chief

1 A nativum Native gold Not combined with other minerals, very ponderous, ductile, visible in its matrix Found in the sand of a stream flowing from mount Groghan near Arklow, in the county of Wicklow Ireland, in Cornwall and Scotland, in the mines of Peru and Chili, New Spain, Java, Siberia, Transylvania Spain, Hungary, France, and most countries of Europe, generally near the surface or mixed with sand in the beds of rivers It is rarely found quite pure, but almost always mixt with silver, copper, or other substances, giving more or less variation to its appearance or colour Its form is generally common, or imbedded in its matrix in various shapes In its crystallized shape it is usually in small aggregate six-sided tables, with a right angled four sided prism ending in a point or terminating at each end by an imperfect four sided prism in cubes, or simple three-sided, or double four sided pyramids It has no perceptible taste or smell, and does not alter or lose its lustre by any exposure to air or water Its malleability is such that one grain of gold may be induced to cover 56½ square inches so ductile is it that an ounce of gold upon silver wire is capable of being extended more than 1300 miles and so great is its tenacity that a gold wire 1/78 inch in diameter is able to support a weight of 15,007 pounds avoirdupoise without breaking The largest lump of native gold ever known was brought from Wicklow, and weighed 22 ounces and contained in 24 parts fine gold $21\frac{5}{8}$, fine silver $1\frac{7}{8}$, and copper and iron alloy $0\frac{7}{8}$

2 A arenarium Sand gold, combined with grains or particles of sand or other substances, and giving them a golden splendour Found in many rivers of South America and the adjacent islands, in Africa, Arabia, India, and many parts of Europe

3 A argentiferum Argentiferous gold, of a pale yellow colour, lighter than fine gold Found in most gold mines, sometimes combined with nearly a fourth part of silver They may be separated by a digestion with nitric acid, which takes up the silver and leaves the gold behind

4 A pyriticorum Gold pyrites of a gold yellow colour, emitting sulphurous flames when made hot Found in the gold mines of Sumatra, New Spain, Hungary, Sweden and Transylvania, sometimes in a crystallized form Yields frequently from 30 to 40 ounces of gold in a hundred pounds weight

Aurum Potabile, potable gold, is a liquid preparation of the metal formerly much used in medicine, but now entirely obsolete

Aurum Fulminans, or *Fulminating Gold*, is a substance compounded of ammonia and oxyd of gold, which is of a dull brown or yellow colour, and, when heated, explodes with considerable violence It is usually exploded by a very gentle heat, in a shovel, but sometimes it requires the heat to be much increased, and if it be touched before it take fire, or the smallest degree of friction be applied, the explosion is immediately brought on The gold is reduced to its metallic state, and, if it be exploded upon paper, a stain is observed of minute particles of gold This experiment is frequently attended with danger, arising from the use of too much heat, from friction, from bruising, with warm water, in a mortar, &c

There are several other compounds which possess the property of violent detonation A list of them may be found under the article FULMINATING SUBSTANCES

Aurum musivum musicum, or *mosaicum*, is a substance formed by heating gradually in a retort, equal parts of white oxide of tin and sulphur it is composed of 60 parts of the former, and 40 of the latter—whence its more appropriate name sulphuretted oxide of tin It consists of beautiful gold coloured flakes, exceedingly light, which adhere to the skin It has no taste, and is insoluble in water, acids, or liquid alkalies It is used as a pigment, and is also mixed with melted glass to imitate the spangles of lapis lazuli

Aurum paradoxicum, problematicum, graphicum, are ores of gold and of tellurium

Aurum Sophisticum, mimic gold, is a preparation made of fine distilled verdigris, 8 ounces, crude Alexandrian tutty 4 ounces, nitre 1½ ounce these, pulverized and mixed together with oil to the consistence of a plaster, are to be put into a red hot German crucible, which is then to be covered, and the furnace filled with coals over the crucible When the mass is melted and cooled and the crucible broken, a fine substance resembling gold, and weighing about 4 ounces, will be found at the bottom, which being malleable may be wrought into any form

AURUNGABAD See AURENGABAD

AUSI, an ancient and very savage people of Libya They celebrated a feast annually in honour of Minerva, in which the girls divided

into two companies, fought with sticks and stones, and those who died of their wounds were concluded not to have been virgins.

AUSITÆ, or ÆSITÆ, a tribe of ancient Arabs, supposed by Bochart to have inhabited the land of Uz mentioned in scripture.

AUSONIUS (in Latin *Decius*, or rather *Decimus*, Magnus Ausonius), one of the best poets of the fourth century, was the son of an eminent physician, and born at Bourdeaux. Great care was taken of his education, the whole family interesting themselves in it, either because his genius was very promising, or that the scheme of his nativity, which had been cast by his grandfather on the mother's side, made them imagine that he would rise to great honour. He made an uncommon progress in classical learning, and at the age of thirty was chosen to teach grammar at Bourdeaux. He was promoted some time after to be professor of rhetoric, in which office he acquired so great a reputation, that he was sent for to court to be preceptor to Gratian, the emperor Valentinian's son. The rewards and honours conferred on him for the faithful discharge of his office prove the truth of Juvenal's maxim, that when fortune pleases she can raise a man from a rhetorician to the dignity of a consul. He was actually appointed consul by the emperor Gratian, in the year 379, after having filled other considerable posts, for, besides the dignity of quæstor, to which he had been nominated by Valentinian, he was made prefect of the Prætorium in Italy and Gaul, after that prince's death. His speech, returning thanks to Gratian on his promotion to the consulship is highly commended. The time of his death is uncertain, he was still living in 392, and lived to a great age. The emperor Theodosius had a great esteem for Ausonius, and pressed him to publish his poems. There is a great inequality in his works, and in his manners and his style there is a harshness which was perhaps rather the defect of the times he lived in, than of his genius. Had he lived in Augustus's reign, his verses, according to good judges, would have equalled the most finished of that age. He is generally supposed to have been a Christian: some ingenious authors indeed think otherwise, but, according to Mr Bayle, without just reason. The best edition of his poems is that of Amsterdam, in 1671.

AUSPEX, a name originally given to those who were afterwards denominated *augurs*. In which sense the word is supposed to be formed from *avis*, bird, and *inspicere*, to inspect, *auspices*, q. d. *avispices*. Some will therefore have auspices properly to denote those who foretold future events from the sight of birds.

A'USPICE. *s.* (*auspicium*, Lat.) 1. The omens of any future undertaking drawn from birds. 2. Protection, favour shown (*B. Jonson*). 3. Influence. 4. A prosperous event.

[illegible]CIOUS. *a.* That which promises [illegible] favourable, fortunate, kind, propitious [illegible]ied to persons.

AUSPI'CIOUSLY. *ad.* In such a manner as to command success.

AUSPICIUM, nearly the same with AUGURY.

AUSTER, one of the four cardinal winds, as Servius calls them, blowing from the south.

AUSTE'RE. *a.* (*austerus*, Lat.) 1. Severe, harsh, rigid (*Rogers*). 2. Sour of taste, harsh (*Blackmore*).

AUSTERE, (αυστηρος, from αυω, *to burn*.) A rough astringent taste.

AUSTE'RELY. *ad.* (from *austere*.) Severely, rigidly (*Milton*).

AUSTE'RENESS. *s.* (from *austere*.) 1. Severity, strictness, rigour (*Shaks.*) 2. Roughness in taste.

AUSTE'RITY. *s.* (from *austere*.) 1. Severity, mortified life, strictness (*Add.*) 2. Cruelty, harsh discipline (*Roscommon*).

AUSTERLITZ, or SLAWKOW, a town of Moravia, in the circle of Brunn; it was almost destroyed by the Swedes in the 17th century; twelve miles ESE. Brunn, and 112 ESE. Prague.

AUSTELL ST., or ST. AUSTEL, a market and stannary town of Cornwall in England. In its immediate vicinity are some valuable tin mines, and at the west end of the town are three blowing houses, where the tin is separated from the ore by means of fire.

A'USTRAL. *a.* (*australis*, Lat.) Southern.

AUSTRALIS CORONA & PISCIS. See CORONA and PISCIS.

AUSTRALASIA, in geography, a name given to those countries that lie to the south of Asia, as New Holland, New Guinea, New Zealand, &c.

To A'USTRALIZE. *v. n.* (from *auster*, Lat.) To tend toward the south (*Brown*).

A'USTRINE. *a.* (*austrinus*, Lat.) Southern.

AUSTRIA (archduchy of), a country of Germany, bounded on the north by Bohemia and Moravia, on the east by Hungary, on the south by Stiria, and on the west by the archbishopric of Saltzburg, the river Ens divides it into Upper and Lower. Vienna is the capital of the latter, and Lintz of the former, the whole six hundred and thirty seven thousand square miles; and in the year 1784 the number of the inhabitants was one million five hundred and eighty-two thousand, three hundred and ninety five. It exceeds all other provinces of Germany in the fertility of its soil, abundance of its pastures, salubrity of the air, and beauty of the country. Corn, wine, and fruit, every where abound; the saffron is superior to that of India. The inhabitants are polished, intelligent, and warlike. Austria was erected into a marquisate by the emperor Otho I. and into a duchy by Frederick Barbarossa. The emperor Rodolphus, of the house of Hapsburg, seized Austria from Othogar, king of Bohemia, who was slain in a battle near Vienna. This emperor laid the foundation of the grandeur of the present house of Austria, from which most emperors have since been chosen. Austria was then erected into an archduchy with great privileges. The cir-

[illegible]ele of Austria contains, besides the archduchy, the duchies of Stiria, Carinthia, Carniola, the county of Tyrol, the bishoprics of Trent and Brixen, the four forest towns, Rheinfeld, [illegible]ingen, Laufenburg, and Walshut, Austrian Swabia, and the Bris[illegible]. To the house of Austria likewise belong Bohemia, Moravia, part of Silesia, Hungary, Sclavonia, Transylvania, [illegible], part of Servia, and part of W[illegible]; the Milanese, and, formerly, the [illegible] part of Brabant, Luxemburg, Namur, [illegible] of Hainault, and part of Flanders.

AUSTROMANCY, s. Soothsaying.

AUTER DROIT, in law, is when persons [illegible] in another's right, [illegible]

AUTER FOIS ACQUIT, in law, a plea [illegible] [illegible] has been acquitted of the [illegible] with which he is charged. [illegible] [illegible] [illegible] [illegible]

AUTHENTIC [illegible] [illegible] [illegible] something clothed in all its forms [illegible] [illegible] [illegible] [illegible] we say, *a [illegible]* [illegible]

[illegible] Dr Watson has [illegible] the difference between [illegible] [illegible] A genuine [illegible] that which was written by the person whose name it bears as the author of it. An [illegible] book, that which relates matters of fact as they really happened. A book may be genuine without being authentic, and a book may be authentic without being genuine. The books written by Richardson and Fielding are genuine books, though the histories of Clarissa and Tom Jones are fables. The history of the island of Formosa is a genuine book; it was written by Psalmanazar; but it is not an authentic book (though it was long esteemed as such), for the author, in the latter part of his life, took shame to himself for having imposed on the world, and confessed that it was a mere romance. Anson's voyage may be considered as an authentic book, it probably containing a true narration of the principal events recorded in it; but it is not a genuine book, since it was not written by Walter, to whom it is ascribed, but by Robins. This distinction is judiciously applied to the [illegible] [illegible] of the authenticity of the [illegible] books by Dr Watson, in [illegible] second letter of his Apology for the Bible, in reply to Paine's Age of Reason.

AUTHENTIC, in music, a term used in speaking of the ecclesiastical modes of *canto fermo* or plain song. An authentic tone or mode is when the octave is harmonically divided in the proportion 6 4 3. See MODES.

AUTHENTICAL. *a.* Authentic (*Hale*).

AUTHENTICALLY. *ad.* (from *authentical*) With all the circumstances requisite to procure authority (*South*).

AUTHENTICALNESS. *s.* (from *authentical*) The quality of being authentick; genuineness; authority (*Addison*).

AUTHENTICITY. *s.* (from *authentick*) Authority; genuineness.

AUTHENTICK. *a.* (*authenticus*, Lat.) That has every thing requisite to give it authority; genuine; not fictitious (*Cowley*).

AUTHENTICKLY. *ad.* (from *authentick*.) After an authentick manner.

AUTHENTICKNESS. *s.* (from *authentick*.) Authenticity.

AUTHOR. *s.* (*auctor*, Lat.) 1. The first beginner or mover of any thing (*Hooker*). 2. The efficient; he that effects or produces any thing (*Dryden*). 3. The first writer of any thing (*Dryden*). 4. A writer in general (*Shaks.*).

AUTHORITATIVE. *a.* (from *authority*.) 1. Having due authority. 2. Having an air of authority; positive (*Swift*).

AUTHORITATIVELY. *ad.* (from *authoritative*.) 1. In an authoritative manner; with a show of authority. 2. With due authority.

AUTHORITATIVENESS. *s.* Authoritative appearance.

AUTHORITY. *s.* (*auctoritas*, Lat.) 1. Legal power (*Shakspeare*). 2. Influence; credit (*[illegible]*). 3. Power; rule (*Shaks.*). 4. Support; countenance (*Ben Jonson*). 5. Testimony (*[illegible]*). 6. Credibility (*Hooker*).

AUTHORITY, in law, a power given by word or writing, to a second person to act something, and may be by writ, warrant, commission, letter of attorney, &c.

AUTHORITY is represented, in painting, like a venerable matron, sitting in a chair of state, richly clothed in a garment embroidered with gold, holding in her right hand a sword, and in her left a sceptre. By her side is a double trophy of books and arms.

AUTHORIZATION. *s.* (from *authorize*.) Establishment by authority (*Hale*).

To AUTHORIZE. *v. a.* (*autoriser*, Fr.) 1. To give authority to any person (*Dryden*). 2. To make any thing legal (*[illegible]*). 3. To establish any thing by authority (*Hooker*). 4. To justify; to prove a thing to be right (*Locke*). 5. To give credit to any person or thing (*South*).

AUTOCABDALI, in antiquity, an order of musicians, who wore an ivy crown or garland.

AUTOCEPHALUS, a person who is his own ruler or master, and who has no other over him. The word is compounded of αυτος, [illegible], and [illegible], *caput*, head.

AUTOCHTHONES, an appellation assumed by certain nations, importing that they sprung from the soil which they still inhabited. In this sense the word amounts to the same with *[illegible]*.

AUTOCRASY. *s.* (αυτοκρατεια.) Independent power; supremacy.

AUTOCRATOR (from αυτο, and κρατος, *power*.) A person vested with an absolute independent power, by which he is rendered unaccountable to any other for his actions. The power of the Athenian generals, or commanders, was usually limited, so that, at the

expiration of their office, they were liable to render an account of their administration. But, on some extraordinary occasions, they were exempted from this restraint, and sent with a full and uncontroulable authority: in which sense they were styled Αὐτοκράτορες.

AUTO DA FE. See ACT OF FAITH.

AUTODIDACTUS (from αὐτός, and διδάσκω, *I teach*). A person self-taught.

AUTOGRAPH, the very hand writing of any person, or the original of a treatise or discourse. The word is used in opposition to a *copy*. The word is formed of αὐτός, and γράφω, *scribo*.

Autographa, or original manuscript of the New Testament, are the copies written by the apostles, or by amanuenses under their inspection, though even used in this sense the term is not correct. St Paul seems generally to have adopted the latter mode, but to prevent the circulation of spurious epistles, he wrote the concluding benediction with his own hand. The early loss of the autographa of the New Testament affords matter of surprise and regret, when it is known that the original manuscripts of Luther, and other eminent men who lived at the time of the reformation, are still subsisting. Various causes may have contributed to this circumstance, some of which have been alleged in Griesbach's "Historia Textus Epistolarum Pauli, sect. ii. See also Michaelis's Introduct. vol. i. p. 253.

AUTOGRAPHICAL. *a.* (from *autography*.) Of one's own writing.

AUTOGRAPHY. *s.* (αὐτόγραφον.) A particular person's own writing, the original.

AUTOLITHOTOMUS, he who cuts himself for the stone. Of this we have a very extraordinary instance given by Reiselius, in the Ephemerides of the Academy Naturæ Curiosorum, dec. 1. an. 3. obs. 192.

AUTOMATICAL. *a.* (from *automaton*.) Having the power of moving itself.

AUTOMATON (from αὐτός, *ipse*, and μάομαι, *I am excited*, whence αὐτόματος, *spontaneous*.) A seemingly self-moving machine, or one so constructed, by means of weights, levers, pulleys, springs, &c. as to move for a considerable time, as if it were endued with animal life. And according to this description, clocks, watches, and all machines of that kind, are automata.

It is said, that Archytas of Tarentum, 400 years before Christ, made a wooden pigeon that could fly; that Archimedes also made similar automatons; that Regiomontanus made a wooden eagle that flew forth from the city, met the emperor, saluted him, and returned; also that he made an iron fly, which flew out of his hand at a feast, and returned again after flying about the room; that Dr. Hook made the model of a flying chariot, capable of supporting itself in the air. Many other surprising automatons we have been eye-witnesses of in the present age: thus, we have seen figures that could write, and perform many other actions in imitation of animals. M. Vaucanson made a figure that played on ..., the same gentleman also made a duck, which was capable of eating, drinking and imitating exactly the voice of a natural one, and, what is still more surprizing, the food it swallowed was evacuated in a digested state, or considerably altered on the principles of solution; also the wings, viscera, and bones were formed so as strongly to resemble those of a living duck, and the actions of eating and drinking shewed the strongest resemblance, even to the muddling the water with its bill. M. Le Droz of la Chaux de Fonds, in the province of Neufchatel, has also executed some very curious pieces of mechanism: one was a clock, presented to the king of Spain, which had, among other curiosities, a sheep that imitated the bleating of a natural one, and a dog watching a basket of fruit, that barked and snarled when any one offered to take it away; besides a variety of human figures, exhibiting motions truly surprising. The celebrated chess player of M. Kempell, which we have described under the word ANDROIDES, is likewise a curious specimen of ingenuity, but ingenuity of a different sort from what has been generally supposed, as will appear by the following interesting extract from Dr Hutton's Math. and Philos. Dictionary.

Thomas Collinson, esq. nephew of the late ingenious Peter Collinson, esq. writing to Dr. Hutton communicates these particulars:—"Turning over the leaves of your late valuable publication, part I. of the Mathematical and Philosophical Dictionary, I observed under the article *Automaton* the following: 'But all these seem to be inferior to M. Kempell's chess player, which may truly be considered as the greatest master piece in mechanics that ever appeared in the world,' (upon which Mr. Collinson observes) "So it certainly would have been, had its scientific movements depended merely on mechanism. Being slightly acquainted with M. Kempell when he exhibited his chess playing figure in London, I called on him about five years since at his house at Vienna, another gentleman and myself being then on a tour on the continent. The baron (for I think he is such) showed me some working models which he had lately made—among them an improvement on Arkwright's cotton mill, and also one which he thought an improvement on Boulton and Watt's last steam-engine. I asked him after a piece of speaking mechanism, which he had shown me when in London. It spoke as before, and I gave the same word as I gave when I first saw it, *Exploitation*, which it distinctly pronounced with the French accent. But I particularly noticed, that not a word passed about the chess player, and of course I did not ask to see it. In the progress of the tour I came to Dresden, where becoming acquainted with Mr. Eden, our envoy there, by means of a letter given me by his brother lord Auckland, who was ambassador when I was at Madrid, he obligingly accompanied me in seeing several things worthy of attention. And he introduced my companion and myself to a gentleman of rank and talents, named Joseph

Freidrick Freyhere, who seems completely to have discovered the vitality and soul of the chess-playing figure This gentleman courteously presented me with the treatise he had published, dated at Dresden, Sept 30 1789, explaining its principles, accompanied with curious plates neatly coloured This treatise is in the German language, and I hope soon to get a translation of it A well-taught boy, very thin and small of his age (sufficiently so that it he could be concealed in a drawer almost immediately under the chess board), agitated the whole Even after this abatement of its being strictly an automaton, much ingenuity remains to the contriver This discovery at Dresden accounts for the silence about it at Vienna, for I understand, by Mr Eden, that Mr Freyhere had sent a copy to baron Kempell though he seems unwilling to acknowledge that Mr F has completely analysed the whole

"I know that long and uninteresting letters are formidable things to men who know the value of time and science, but as this happens to be upon the subject, forgive me for adding one very admirable piece of mechanism to those you have touched upon When at Geneva, I called upon Droz, son of the original Droz of la Chaux de Fonds (where I also was) He shewed me an oval gold snuff box about (if I recollect right) 4 inches and a half long, by 3 inches broad, and about an inch and a half thick It was double, having an horizontal partition, so that it may be considered as one box placed on another with a lid of course to each box—One contained snuff—In the other, as soon as the lid was opened, there rose up a very small bird, of green enamelled gold, sitting on a gold stand Immediately this minute curiosity wagged its tail, shook its wings, opened its bill of white enamelled gold, and poured forth, minute as it was (being only three quarters of an inch from the beak to the extremity of the tail) such a clear melodious song, as would have filled a room of 20 or 30 feet square with its harmony —Droz agreed to meet me at Florence, and we visited the abbe Fontana together He afterwards joined me at Rome, and exhibited his bird to the pope and the cardinals in the Vatican palace to the admiration, I may say to the astonishment, of all who saw and heard it

Another extract from a second letter upon the same subject, by Mr Collinson, is as follows "Permit me to speak of another automaton of Droz's which several years since he exhibited in England, and which, from my personal acquaintance, I had a commodious opportunity of particularly examining It was a figure of a man, I think the size of life It held in its hand a metal style, a card of Dutch vellum being laid under it A spring was touched which released the internal clockwork from its stop, when the figure immediately began to draw Mr Droz happening once to be sent for in a great hurry to wait upon some considerable personage at the west end of the town, left me in possession of the keys, which opened the recesses of all his machinery He opened the drawing master himself, wound it up, explained its leading parts, and taught me how to make it obey my requirings, as it had obeyed his own Mr. Droz then went away After the first card was finished, the figure rested I put a second, and so on, to five separate cards, all different subjects but five or six was the extent of its delineating powers The first card contained, I may truly say, elegant portraits and likenesses of the king and queen, facing each other and it was curious to observe with what precision the figure lifted up his pencil, in the transition of it from one point of the draft to another, without making the least slur whatever for instance, in passing from the forehead to the eye, nose, and chin, or from the waving curls of the hair to the ear, &c I have the cards now by me'

M Truchet of the French Academy of Sciences, invented and completed a moving picture, which represented an opera in five acts, and in which there was produced a change of decoration in each act This picture contained a prodigious number of figures, which, as in true pantomimes, expressed by their gestures and motions all the requisite actions Each of these figures were extremely small, for the whole machine was only 16½ inches broad, 13½ inches high, and 1½ thick

AUTO'MATOUS *a* (from *automaton*) Having in itself the power of motion (*Brown*)

Boerhaave calls those motions automatic or automatous which depend on the structure of bodies, and in which the will does not contribute, such are respiration, the circulation of the blood &c

AUTO'NOMY *s* (αυτονομια) The living according to one s mind and prescription

A'UTOPSY *s* (αυτοψια) Ocular demonstration (*Ray*)

AUTOP'TICAL *a* (from *autopsy*) Perceived by one s own eyes (*Brown*)

AUTOP'TICALLY *ad* (from *autoptical*) By means of one s own eyes (*Brown*)

AUTRICUM, the capital of the Carnutas, a people of Gallia Celtica afterwards called Carnotena, Carnotenus, and Civitas Carnotenum, now Chartres, in the Orleanois on the Eure 1 long 1 32 N lat 48 47

AUTUMN, the third season when the harvest and fruits are gathered in This begins at the descending equinox, which, in the northern hemisphere, is when the sun enters the sign Libra, or about the 22d day of September, and it ends when winter commences, about the same day in December

AUTUMNAL, something belonging to autumn Thus,

Autumnal Equinox, the time when the sun enters the descending point of the ecliptic, where it crosses the equinoctial, and is so called because the nights and days are then equal

Autumnal Point, the point of the ecliptic answering to the autumnal equinox

Autumnal Signs, are the signs Libra, Scor-

rio, Sagittary, through which the sun passes during the autumn

AUTUN, an ancient town of France, the episcopal see of the department of Saone and Loire, in the late province of Burgundy Lat 46 57 N Lon 4 23 E This is the ancient Bibracte

AUVERGNE, a late province of France, about 100 miles in length, and 75 in breadth It now forms the two departments of Cantal and Puy-de Dome

AVULSION s (avulsio, Lat) The act of pulling one thing from another (Philips)

AUXERRE, a town of France, in the department of Yonne, late an episcopal see of Burgundy Lat 47 48 N Lon 3 39 E

AUXESIS (αὔξησις from αὐξάνω to increase,) the augmentation or growth of a disorder

AUXI'LIAR AUXI'LIARY s (from auxilium, Lat) Helper, assistant (South)

AUXI'LIAR AUXI'LIARY a (from auxilium, Latin) Assistant, helping (Hale)

AUXILIARY VERBS, in grammar, are such as help to form or conjugate others, that is, are prefixed to them, to form or denote the modes or tenses thereof, as, *to have* and *to be*, in the English, *etre* and *avoir*, in the French, *ho* and *sono* in the Italian &c In the English language, the auxiliary verb *am* supplies the want of passive verb

AUXILIATION s (from auxiliatus, Lat) Help, aid, succour

AUXILIUM CURIÆ, in law a precept or order of court, to cite or convene one party at the suit of another

AUXILIUM AD FILIUM MILITEM FACIENDUM, VEL FILIAM MARITANDAM a precept or writ directed to the sheriff of every county where the king or other lords had any tenants, to levy of them reasonable aid towards the knighting his eldest son, or the marriage of his eldest daughter

AUXUME formerly the opulent metropolis of Ethiopia, according to Arrian and Nonnosus, was undoubtedly the same city as the modern Axuma, or as the Abyssines call it, Ascum It is situated about 14 30 of N Lat and 36 2 of E Lon It is now almost ruined, scarcely affording shelter to 100 inhabitants

AUXY WOOL, a name given to the fine wool which is spun in the neighbourhood of Abbeville

AUZOUT, or AZOUT (Adrian), a French mathematician, was born at Rouen and died in 1691 It is generally believed that he invented the micrometer, in 1666, though he was not the only inventor, for it is extremely probable that a similar instrument was contrived by Mr. Gascoigne, by the marquis de Malvasia, by Picard, and by Huygens, totally independent of each other Azout's treatise on the Micrometer was published, after his death, in 1693 He was the first who thought of applying the telescope to the astronomical quadrant

To AWAIT v a (from a and wait) 1 To expect, to wait for (Fairfax) 2 To attend; to be in store for (Rogers)

AWA'IT s (from the verb) Ambush (Spenser)

To AWA'KE v a (peccian, Saxon) 1 To rouse out of sleep (Shakspeare) 2 To raise from any state resembling sleep (Dryden) 3 To put into new action (Pope)

To AWA'KE v n To break from sleep, to cease to sleep (Shakspeare)

AWA'KE a (from the verb) Without sleep, not sleeping (Dryden)

To AWA'KEN v a and v n See AWAKE

To AWA'RD v a (peapo, Saxon) To adjudge, to give any thing by a judicial sentence (Collier)

To AWA'RD v n To judge, to determine (Pope)

AWA'RD s (from the verb) Judgment, sentence, determination (Addison)

AWA'RD in law, the judgment of an arbitrator or of one who is chosen by the parties themselves for terminating their difference See ARBITRATOR

AWA'RE ad (gepapan Sax) Excited to caution, vigilant, attentive (Atterbury)

To AWARE v n To beware, to be cautious (Milton)

AWA'Y ad (apeg, Saxon) 1 In a state of absence (Ben Jonson) 2 From any place or person (Pope) 3 Let us go (Shakspeare) 4 Begone (Smith) 5 Out of one's own hand (Tillotson) 6 On the way (Shakspeare)

AWE s (ege, Saxon) Reverential fear, reverence (South)

To AWE v a (from the noun) To strike with reverence, or fear (Bacon)

AWEBAND s A check

AWEIGH in navigation the anchor is called a-weigh, or a-trip, when the cable being drawn perpendicular to it and continued to be heaved into the ship, at length weighs or trips it out of the ground

A'WFUL a (from awe and full) 1 That strikes with awe, or fills with reverence (Milton) 2 Worshipful, invested with dignity (Shak) 3 Struck with awe, timorous (Watts)

A'WFULLY ad (from awful) In a reverential manner (South)

A'WFULNESS s (from awful) 1 The quality of striking with awe, solemnity (Addison) 2 The state of being struck with awe (Taylor)

To AWHA'PE v a To strike, to confound, to terrify (Spenser)

AWHI'LE ad Some time (Milton)

AWK a (from awkward) Odd (L'Est)

AWL See ALCUS

A'WKWARD a (æpapo, Saxon) 1 Inelegant, unpolite, untaught (Shaks) 2 Unready, unhandy, clumsy (Dryden) 3 Perverse, untoward (Hudibras)

A'WKWARDLY ad (from awkward) Clumsily, unreadily, inelegantly (Watts)

A'WKWARDNESS s (from awkward) Inelegance, want of gentility, oddness, unsuitableness (Watts)

AWL *s* (æle, ale, Sax) A pointed instrument to bore holes (*Mortimer*)

AWL, or AUL, among shoe-makers, an instrument to bore holes through the leather, to facilitate the stitching, or sewing the same The blade of the awl is usually a little flat and bended, and the point ground to an acute angle

AWL SHAPED See SUBULATE

AWL WORT See SUBULARIA

A'WLESS *a* (from *awe* and *less*) 1 Wanting reverence (*Dryden*) 2 Wanting the power of causing reverence (*Shakspeare*)

AWME *s* A Dutch measure answering to what in England is called a tierce, or one seventh of an English ton (*Arbuthnot*)

AWN (*Arista*) A slender sharp process issuing from the glume or chaff in corn and grasses It is commonly called in English the beard, but this term is otherwise applied See BEARD

The awn is either terminating, fixed to the top of the glume, or dorsal, placed on the back or outside of it

It is also straight Geniculate, or bent like the knee joint Recurved, or bowed back Twisted (tortilis,) or coiled like a rope

The Anther sometimes terminates in an awn

AWNED (*aristatus*) Having an awn As the glume and anther

AWNING among seamen, a canopy of canvass extended over the decks in hot weather, to protect them from being split by the heat of the sun, likewise for the convenience of the officers &c

AWNLESS (*muticus*) Having no awn, opposed to awned As in the glume of agrostis and ..., the calyx of serratula, the seeds of adonis, &c An awn, however, is said to be *mutica*, or beardless, when it is not sharp-pointed, *acumine destituta*

AWOKE The preterit of *awake*

AWO'RK *ad* (from *a* and *work*) On work in a state of labour (*Shaks*)

AWO'RKING *ad* (from *awork*) In the state of working (*Spenser*)

AWRY' *a* (from *a* and *wry*) 1 Not in a straight direction, obliquely (*Milton*) 2 Asquint, with oblique vision (*Denham*) 3 Not level unevenly (*Brerewood*) 4 Not equally between two points (*Pope*) 5 Not in a right ..., perversely (*Sidney*)

AXAMENTA, in antiquity, a denomination given to the verses, or songs, of the *salii*, which they sung in honour of the gods and men The word is formed according to some from *axare*, q d *nominare* Others will have the *carmina saliaria* to have been denominated *axamenta*, on account of their being written *in axibus*, or on wooden tables

AXBRIDGE, a town of Somersetshire, with a market on Thursdays Lat 51 17 N Lon 3 0 W The only manufacture of this place is knit hose

AXE *s* (eax, Saxon) An instrument consisting of a metal head with a sharp edge, fixed in a handle (*Dryden*)

AXE, in geometry See AXIS

AXE-FORM See DOLABRIFORM

AXE VETCH See HATCHET VETCH.

AXIL or AXILLA, in botany, the angle formed by a branch with the stem, or by a leaf with the branch So named from its similarity to the armpit Some old writers call it *ala*, but this term is otherwise appropriated

AXILLA (*axilla*, derived by Scaliger from *ago, to act*, after the following progression *ago, axo, axa, axala, axilla*, but more probably directly from the Hebrew אציל, *akil*) The cavity under the upper part of the arm, called the arm pit

AXILLARY ARTERIES Arteriæ axillares The axillary arteries are continuations of the subclavians, and give off, each of them, in the axilla, four mammary arteries, the subscapular and the posterior and anterior circumflex arteries, which ramify about the joint

AXILLARY LEAVES, in botany, growing at the angle formed by the branches with the stem or inserted at the base of the branch Axillary peduncle, scape, cirrus or tendril, and thorn, proceeding from the axils, or from the bosom of the leaves or branches

AXILLARY NERVE Articular nerve A branch of the brachial plexus, and sometimes of the radial nerve It runs outwards and backwards around the neck of the humerus, and is lost in the muscles of the scapula

AXILLARY VEINS Venæ axillares The axillary veins receive the blood from the veins of the arm, and evacuate it into the subclavian vein

AXIM a territory on the gold coast of Guinea, containing two or three villages on the sea-shore The chief town is of the same name, and lies in lat 5 0 N lon 2 4 W

AXINIA, the ancient name of a mountain of Peloponnesus, in Arcadia

AXINIUM the name given by Appian to an ancient city of Spain

AXINOMANCY AXINOMANTIA, (from *αξινη securis*, and *μαντεια, divinatio*,) an ancient species of divination, or a method of foretelling future events by means of an axe or hatchet This art was in considerable repute among the ancients, and was performed, according to some, by laying an agate-stone on a red-hot hatchet, and also by fixing a hatchet on a round stake so as to be exactly poised, then the names of those that were suspected were repeated, and he at whose name the hatchet moved was pronounced guilty

AXIOM AXIOMA (from *αξιοω, I am worthy*) A self evident truth, or a proposition whose truth every person receives at first sight Thus, that the whole is greater than a part, that a thing cannot be and not be at the same time, and that from nothing, nothing can arise, are axioms

AXIOM is also an established principle in some art or science Thus, it is an axiom in physics, that nature does nothing in vain, that effects are proportional to their causes, &c So it is an axiom in geometry, that things

equal to the same third are also equal to one another, that if to equal things you add equals, the sums will be equal, &c It is an axiom in optics, that the angle of incidence is equal to the angle of reflection, &c

NEWTONIAN AXIOMS, OR LAWS OF MOTION, are the three following

1 Every body perseveres in its state of rest or uniform motion in a right line, until a change is effected by the agency of some external force

2. Any change effected in the quiescence or motion of a body is in the direction of the force impressed, and is proportional to it in quantity

3 Action and reaction are equal and in contrary directions

When speaking of these axioms, or laws of motion, it ought always to be recollected that they are not the efficient, operative, causes of any thing A law presupposes an agent, for it is only the mode, according to which an agent proceeds it implies a power, for it is the order according to which that power acts Abstracted from this agent, this power, the law does nothing, is nothing so that a law of nature or of motion can never be assigned as the adequate cause of phenomena, exclusive of power and agency

The Newtonian axioms are, in reality, intermediate propositions between geometry and philosophy, through which mechanics becomes a mathematical branch of physics, and its conclusions possessed of such coherence and consistency among themselves, and with matter of fact as are rarely to be found in other branches, which admit not of so intimate a union with the science of quantity

The evidences from which our assent to these axioms is derived, are of various kinds 1 From the constant observation of our senses, which tend to suggest the truth of them in the ordinary motion of bodies, as far as the experience of mankind extends 2 From experiments, properly so called 3 From arguments *a posteriora* One or other of these kinds of evidence generally forms a part of our most valuable treatises on mechanics and physics but there is a fourth way in which the truth of these axioms may be deduced, and which, as it is concise, we shall here adopt, we mean that in which they are shewn to be laws of human thought, intuitive consequences of the relations of those ideas which we have of motion, and of the causes of its production and changes

Thus, with respect to the first axiom It has been fully demonstrated that the powers or forces, of which we speak so much, are never the immediate objects of our perception Their very existence, their kind, and their degree, are instinctive inferences from the motions which we observe and class It evidently follows from this experimental and universal truth, 1st That where no change of motion is observed, no such inference is made, that is, no power is supposed to act But whenever any change of motion is observed, the inference is made, that is, a power or force is supposed to have acted

In the same form of logical conclusion, we must say that, 2d When no change of motion is supposed or thought of, no force is supposed, and that whenever we suppose a change of motion, we, in fact, though not in terms, suppose a changing force And, on the other hand, whenever we suppose the action of a changing force, we suppose the change of motion, for the action of this force, and the change of motion, is one and the same thing We cannot think of the action without thinking of the indication of that action, that is, the change of motion —In the same manner, when we do not think of a changing force, or suppose that there is no action of a changing force we in fact, though not in terms suppose there is no indication of this changing force, that is, that there is no change

Whenever, therefore, we suppose that no mechanical force is acting on a body we, in fact, suppose that the body continues in its former condition with respect to motion If we suppose that nothing accelerates or retard, or deflects the motion, we suppose that it is not accelerated, nor retarded nor deflected Hence follows the proposition in express terms— We suppose that the body continues in its former state of rest or motion unless we suppose that it is changed by some mechanical force

And again with regard to the 2d axiom, it may almost be considered as an identical proposition, for it is equivalent to saying that the changing force is to be measured by the change which it produces, and that the direction of this force is the direction of the change Of this there can be no doubt when we consider the force in no other sense than that of the cause of motion, paying no attention to the form or manner of its exertion Thus, when a pellet of tow is shot from a pop gun by the expansion of the air compressed by the rammer, or when it is shot from a toy pistol by the unbending of the coiled wire, or when it is nicked away by the thumb like a marble—if, in all these cases, it moves off in the same direction, and with the same velocity, we cannot consider or think of the force, or at least of its exertion, as any way different Nay, when it is driven forward by the instantaneous percussion of a smart stroke, although the manner of producing this effect (if possible) is essentially different from what is conceived in the other cases, we must still think that the propelling force, considered as a propelling force, is one and the same Thus, this law of motion, as thus expressed by Sir Isaac Newton, is equivalent to saying "That we take the changes of motion as the measures of the changing forces, and the direction of the change for the indication of the direction of the forces

As to the third axiom, it is commonly stated as founded on experience alone, and not as a necessary truth It is indeed a universal fact it is now found that the reciprocity of action,

which is affirmed in this axiom, obtains throughout the solar system with the utmost precision It is also, we conceive, a law of human thought To assert the contrary, is to maintain an absurdity for if action and reaction are not equal, the greater either acts against nothing, and is therefore not action, or exists without a cause See ACTION

AXIOS, a form of acclamation, anciently used by the people in the election of bishops When they were all unanimous, they cried out αξιος he is worthy, or αναξιος, unworthy

AXIOSIS, in rhetoric, denotes the third part of an exordium, sometimes also called προτασις, and containing some new proposition more nearly relating to the matter in hand than the προπαρασκευη

This in Cicero's oration pro Milone, the protasis is, "Non possum non timere, judices, nisi hic novi judicii forma," the καταςκευη, "Nec enim ex corona confessus vester cinctus est qui solebat" the αξιωσι "Sed me recreat Pompeii consilium, optimus sapientiae non fuerit quem in sententiis judicum tradidit, talis nihilum dederit" the basis βασις "Quamobrem adeste animi judices, et timorem, si quem habetis, deponite

AXIS (axis, from *ago*, to act) See DENTALIS

AXIS, in astronomy, an imaginary right line supposed to pass through the earth sun planets satellites, &c and about which they perform their respective diurnal rotations

The earth and planets in their progress through the annual orbit, move in such a manner that the axis of each always keeps parallel to itself, or points to the same parts of the heavens See PARALLELISM and AXIS OF ROTATION

The axis of the earth is inclined to the ecliptic in an angle of nearly 66½°, a position which is well adapted for promoting the fertility of the earth and rendering it habitable this position it has been proved (see ASTRONOMY) by La Grange and La Place, cannot far be deviated from, while the universe continues to be regulated by the same laws

Dr Keill, in his Examination of Burnet's Theory of the Earth, has pointed out many advantages which result from this inclination of the axis, particularly in ripening the fruits of the earth, and he has proved the truth of much that was advanced by Kepler in his Epit Astron Copern to the same effect Among other curious particulars, Keill has shewn that we who live beyond 45° of latitude, and have greatest need of the sun's heat, have more of it during the whole year than if the equator and ecliptic coincided, whereas they who live between the equator and 45 deg of latitude, and are rather too much exposed to the sun than too little, have, on account of the present inclination, less of the sun's heat than if the earth were in a right position P 71, &c These considerations ought to lead us into a transcendent admiration of the Divine Wisdom and Goodness

Professor Bode of Berlin has lately published Thoughts on the supposed Variations in the Axis and Poles of the Earth For which, see Phil Mag No 44

Axis of the Horizon, Equator, &c Is a right line drawn through the centre of the respective circle, perpendicular to its plane

AXIS, in geometry, the straight line in a plane figure, about which it revolves, to produce or generate a solid Thus, if a semicircle be moved round its diameter at rest, it will generate a sphere, whose axis is that diameter And if a right angled triangle be turned about its perpendicular at rest it will describe a cone, whose axis is that perpendicular

Axis is yet more generally used for a right line conceived to be drawn from the vertex of a figure to the middle of the base So the

Axis of a Circle or Sphere, is any line drawn through the centre and terminated at the circumference, on both sides

Axis of a Cone, is the line from the vertex to the centre of the base

Axis of a Cylinder is the line from the centre of the one end to that of the other

Axis of a conic Section is the line from the principal vertex, or vertices, perpendicular to the tangent at that point The ellipse and hyperbola have each two axes, which are finite and perpendicular to each other but the parabola has only one, and that infinite in length

Transverse Axis in the ellipse and hyperbola, is the diameter passing through the two foci and the two principal vertices of the figure In the hyperbola it is the shortest diameter but in the ellipse it is the longest

Conjugate Axis, or *Second Axis*, in the ellipse and hyperbola, is the diameter passing through the centre, and perpendicular to the transverse axis It is the shortest of all the conjugate diameters

Axis of a curve Line is still more generally used for that diameter which has its ordinates at right angles to it when that is possible

AXIS, in mechanics, a certain line about which a body may turn Axes are of various kinds, as

Axis of a Balance, the line upon which it moves or turns

Axis of Rotation, the line about which a body really revolves, when it is put into motion The impulse given to a homogeneous sphere, in a direction which does not pass through its centre, will cause it to revolve constantly round the diameter, which is perpendicular to a plane passing through its centre, and the line of direction of the impressed force New forces acting on all its parts, and of which the result [illegible] through its centre, will not change the parallelism of its axis of rotation Thus it is that the axis of the earth remains always nearly parallel to itself in its revolution round the sun, without its being necessary to suppose, with Copernicus, an annual motion of the poles of the earth round those of the ecliptic

If the body possess a certain figure, its axis of rotation may change every instant The

determination of these changes, whatever may be the forces acting on the bodies, is one of the most interesting problems of mechanics respecting hard bodies, on account of its connection with the precession of the equinoxes, and the libration of the moon The solution of this problem has led to a curious and very useful result, namely, that in all bodies there exist three axes perpendicular to each other, round which the body may turn uniformly when not solicited by external forces On this account these axes are properly called principal axes of rotation

Axis of Oscillation, is a line parallel to the horizon, passing through the centre, about which a pendulum vibrates, and perpendicular to the plane in which it oscillates

Axis in Peritrochio, one of the five mechanical powers, consisting of a peritrochium or wheel, and moveable together with it about its axis The power is applied at the circumference of the wheel, and the weight is raised by a rope that is gathered up on the axis while the machine turns round The power may be conceived as applied at the extremity of the arm of a lever, equal to the radius of the wheel, and the weight as applied at the extremity of a lever, equal to the radius of the axis, only those arms do not meet at one centre of motion, as in the lever, but in place of this centre we have an axis of motion, viz the axis of the whole machine See MECHANICS

The use of this machine is to raise weights to a greater height than the lever can do, because the wheel is capable of being turned several times round, which the lever is not, and also to communicate motion from one part of a machine to another Accordingly, there are few compound machines without it

If the power applied to the axis in peritrochio, in a direction tangential to the periphery of the wheel, or perpendicular to the scytala or spoke, be to a weight, as the radius of the axle to the radius of the wheel, or the length of the spoke, the power will just sustain the weight, that is, the weight and power will be in equilibrio

AXIS, in optics Optic axis, or visual axis, is a ray passing through the centre of the eye, or falling perpendicularly on the eye

Axis of a Lens, or *Glass*, is the axis of the solid of which the lens is a segment Or the axis of a glass, is the line joining the two vertices or middle points of the two opposite surfaces of the glass

Axis of a Magnet, is a line passing through the middle of a magnet lengthwise in such a manner as that, however the magnet is divided, provided the division is made according to a plane in which such line is found, the magnet will be cut or separated into two loadstones, and the extremes of such lines are called the poles of the magnet

AXIS, in anatomy, the second vertebra of the neck, so called from the head's turning on it like an axis

AXIS, in zoology, an animal of the deer kind See CERVUS

AXLE A'XLE-TREE *s* (*axis*, Latin) The pin which passes through the midst of the wheel, on which the circumvolutions of the wheel are performed (*Milton*)

AXMINSTER, a town of England, in the county of Devon, on the river Ax, celebrated for a carpet manufacture, wrought of any size in one piece, with needles by women There are likewise manufactures of broad and narrow cloth, cotton-tapes, and druggets The number of inhabitants of the town and parish 2500 It has a market weekly twenty-six miles E Exeter, and 147 W London Lat 50 40 N Lon 3 8 W

AXUM, once the large and populous capital of Abyssinia, now an inconsiderable town, containing about 600 houses Lat 14 6 N Lon 38 30 E

AXUNGIA (*axungia*, from *axis*, an axle-tree, and *unguo*, to anoint) In medicine, hog's lard

AXUNGIA OF GLASS, a scum or salt taken from the top of the matter of glass before it is thoroughly vitrified

AXYRIS In botany, a genus of the class and order monœcia triandria Male, calyx three parted, corolless Fem calyx two leaved, corolless, styles two, seed one Three species, all of Siberia

AY *ad* (perhaps from *aio*, Latin) Yes (*Shakspeare*)

AYE *ad* (apa, Saxon, *au*) Always, to eternity, for ever (*Philips*)

AYE-AYE, in zoology, a singular quadruped discovered in Madagascar, about the size of a rabbit Its name is an exclamation of the inhabitants, which M Sonnerat applied to this animal Both male and female are slothful and gentle animals and, like owls, they are scarcely able to discern objects in the daytime They live chiefly under ground, feeding on worms and insects which they find in the earth or in crevices in the trunks of trees whence they extract them by means of their long and slender toe Sonnini forms a new genus of this animal under the name of chiromys, the generic character of which is its long toes, and the thumb of the hinder paw turned backward It belongs to the class primates, order glires, and is perhaps related to the marmot tribe

AYENIA In botany, a genus of the class and order pentandria monogynia Petals five, united into a star, nectary a cup covering the pistil, and bearing the stamens, capsule five-celled Four species all natives of America or the West Indies

A'YGREEN *s* The same with houseleek

AYGULA, in zoology See SIMIA

AYLESBURY, in geography See AYLESBURY

AYLOFFE (Sir Joseph), of Framfield in Sussex, was descended from a Saxon family, anciently seated at Bocton Alof near Wye, in the county of Kent, in the reign of Henry III who removed to Hornchurch in the county of Essex in that of Henry IV and to Sudbury in that of Edward IV He was born about

the year 1708, received the early part of his education at Westminster-school, admitted of Lincoln's Inn 1724, and in the same year was entered a gentleman-commoner at St John's college, Oxford, which college he quitted about 1728, elected F A S February 10, 1731, one of the first council under their charter, 1751, vice president, and F R S June 3, 1731 He prevailed on Mr Kirby, painter in Ipswich, to make drawings of a great number of monuments and buildings in Suffolk, of which twelve were engraved, with a description, 1748, and others remain unpublished He had at that time an intention to write a history of the county, but, being disappointed of the materials which he had reason to expect for so laborious a work, they were never published On the building of Westminster bridge, he was appointed secretary to the commissioners 1736 7, and on the establishment of the Paper office, on the respectable footing it at present is, by the removal of the state-papers from the old gate at Whitehall to new apartments at the Treasury, he was nominated the first in the commission for the care and preservation of them In 1737 he circulated proposals for printing, by subscription, Encyclopadia, or, a rational Dictionary of Arts and Sciences, and Trade In 1772 he published, in 4to Calendars of the Ancient Charters &c and of the Welsh and Scottish Rolls now remaining in the Tower of London, &c and in the introduction gives a most judicious and exact account of our public records He drew up the account of the chapel of London-bridge, of which an engraving was published by Vertue, 1748, and again by the Society of Antiquaries, 1777 His historical description of the interview between Henry VIII and Francis I on the Champ de Drap d'Or, from an original painting at Windsor, and his account of the paintings of the same age at Cowdray, were inserted in the third volume of the Archæologia, and printed separately to accompany engravings of two of these pictures by the Society of Antiquaries, 1775 His account of the body of Edward I as it appeared on opening his tomb, 1774, was printed in the same volume, p 376 Having been educated, as has been observed, at Westminster, he acquired an early affection for that venerable cathedral, and his intimate acquaintance with every part of it displayed itself in his accurate description of five monuments in the choir, engraved in 1779 by the same Society, who must reckon, among the many obligations which they owe to his zeal and attention to their interests, the last exertions of his life to put their affairs on the most respectable and advantageous footing, on their removal to their new apartments in Somerset-place He superintended the new edition of Leland's Collectanea, in nine volumes 8vo and also of the Liber Niger Scaccarii, in two volumes 8vo, to each of which he added a valuable appendix He also revised through the press a new edition of Hearne's Curious Discourses, 1771, two volumes 8vo, and likewise the Registrum Roffense, published by Mr Thorpe in 1769, folio At the beginning of the seventh volume of Somers's Tracts is advertised, A Collection of Debates in Parliament before the Restoration, from MSS by sir Joseph Ayloffe, bart which is supposed never to have appeared Sir Joseph died at his house at Kennington-lane, Lambeth, April 19, 1781, aged seventy-two

AYR, a county of Scotland, bounded on the west by the Frith of Clyde, on the south by the county of Wigton and county of Kircudbright, on the east by the counties of Lanerk and Dumfries, and on the north by the county of Renfrew, its form nearly triangular, the base towards the Clyde, with a considerable hollow in the centre, and contains about 1025 square miles The chief towns are Ayr, Girvan, Ballantrae, Saltcoats Kilmarnock, and Irvine The principal rivers are the Ayr, the Doon, and the Irvine The population of this county in 1800 was 84,306, of which 44 640 were females

Ayr, a seaport town of Scotland, in the county to which it gives name, on the Frith of Clyde The number of houses in Ayr is about 735, and the population 5192 It had formerly a considerable herring fishery rather more than forty years ago, these fish were caught in great abundance, but after they left the coast, haddock and cod have been plentiful ever since sixty miles SW Edinburgh Lat 55 32 N Lon 4 30 W Greenwich

Ayr, a river of Scotland, which rises on the borders of Lanarkshire crosses the county to which it gives name, and runs into the Frith of Clyde, near the town of Ayr

Ayr, a river of France, which runs into the Aisne, near Grandpre

AYRAINES, a town of France in the department of the Somme, and chief place of a canton, in the district of Amiens nine miles SSE Abbeville

AYRY or Aery, a nest or company of hawks, so called from the old French word *aire* which signifies the same, now sometimes applied to nests of other birds

AYUD, a province of Hindostan, containing the most northern countries belonging to the Moguls, and situated to the northwest of the Ganges

AZAB a territory on the Abyssinian coast of the Arabian gulf, near the straits of Babelmandel, which has been from time immemorial the mart of frankincense, myrrh, and balsam

AZAC (a ak, Arab) Gum ammoniac

AZALEA American upright honeysuckle a genus of the class and order pentandria monogynia Corol campanulate, stamens inserted on the receptacle, capsule five celled Seven species, widely distributed over the globe, of which the a procumbens is a native of our own mountains

AZALEUS (αζαλεο, from αζω, *to dry up, or exhaust*) A term in old horsemanship applied to an old worn-out jade

AZAMOR, a sea port town of Morocco, in

Africa, it was formerly a considerable place, but was demolished by the Portuguese in 1513 Lat 32 50 N Lon 7 0 W

AZARIAH, the name of one of the kings of Judah, see 2 Kings, xv 2 Chron xxvi There are indeed many high priests and others mentioned in Scripture, and in the Jewish history, who bore the name of Azariah

AZAROLE See CRATÆGUS

AZELFOGE, in astronomy, a fixed star in the Swan's tail

AZERINA See PRUNUS

AZIMUTH, in astronomy, an arch of the horizon, intercepted between the meridian of the place, and the vertical circle passing through the centre of an object it is found at the equinox by saying As the radius, to the tang of the latitude of the place, so is the tangent of the sun's or star's altitude, to the cosine of the azimuth from the south To find the sun's or a star's azimuth at other times, see O Gregory's Astron ch vi

Magnetical Azimuth, is an arch of the horizon contained between the sun's azimuth circle and the magnetical meridian

AZIMUTH COMPASS, an instrument adapted to find in a more accurate manner than by the common sea compass the sun or star's magnetical amplitude, or azimuth It is also used to take the bearings of headlands, ships, and other objects at a distance The azimuth compass differs from the common sea compass in this that the circumference of the card or box is divided into degrees, and there is fitted to the box an index with two sights which are upright pieces of brass placed diametrically opposite to each other, having a slit down the middle of them, through which the sun or star, or other object is to be viewed, at the time of observation See COMPASS

AZIMUTH DIAL, one whose style or gnomon is at right angles to the plane of the horizon

AZIMUTHS called also vertical circles, are great circles intersecting each other in the zenith and nadir, and cutting the horizon at right angles

AZINCOURT See AGINCOURT

AZMER, the capital of a province of the same name in Mogulstan, in the East Indies Its principal trade is in saltpetre

AZOGA SHIPS, the Spanish ships which carry quicksilver to the Spanish West Indies

AZONI in ancient mythology a name applied by the Greeks to such of the gods as were deities at large not appropriated to the worship of any particular town or country, but acknowledged in general by all countries and worshipped by every nation These the Latins called dii communes Of this sort were the Sun Mars, Luna, &c

AZOPH See ASOPH

AZOPH (Sea of, called by the ancients Palus Mæotis, formerly by the Russians the Putrid Sea, is a gulf of the Euxine to which it is joined by a strait It is situated in the dominions of Russia, lon about 57 E of Ferro and lat 45 50 to 47 20 N It is about 210 miles in length and from 40 to 60 in breadth

AZORES, or WESTERN ISLANDS, a group of islands, situated in the Atlantic ocean, between 37 and 40 degrees of N lat and 25 and 32 degrees of W lon They are nine in number, and their names are St Maria, St Miguel Terceria, St George Graciosa, Fayal, Pico, Flores, and Corvo All these islands enjoy a very clear sky and salubrious air they are extremely fertile in corn, wine, and a variety of fruits, and they breed large quantities of cattle The wine called Fayal is chiefly raised in the island of Pico, which lies opposite to Fayal and is the largest of all the Azores About 20,000 pipes of that wine are made yearly These islands have greatly suffered by earthquakes They were first discovered by Martin Behaim

AZORIAN FENNEL See FINOCHIO

AZOT (*a otum* from *α* priv and *ζ*, *to live* because it is unfit for respiration) Azot Phlogisticated air Mephitic air Nitrogen Alcaligen Mofette A tasteless and inodorous element very important in chemistry which is never found completely separated from every other substance, except in the state of gas It is considered as a simple body, having never been decomposed and is incombustible It is somewhat lighter than atmospheric air, its specific gravity being according to Scheele 00120 and according to Lavoisier 00115 This substance exists very abundantly in nature, forming the greater part or about three fourths of the atmosphere the peculiar and almost characteristic ingredient of animal matter, the basis of the nitric acid and one of the constituents of the volatile alkali

Pure azot or azotic gas is synonymous with the phlogisticated air of Scheele and Priestley the atmospherical mephitis of Lavoisier and the nitrogen gas of Chaptal and some other French chemists

The distinguishing characteristic of animal substances, as opposed to vegetable, is the possession of a prodigious predominance of azot or nitrogen compared with their carbon while vegetable substances possess an equal superiority of carbon over their proportion of azot Pure vegetable matters perhaps contain no azot whatever It is from the abundance of azotic gas exhaled by the decomposition of nitre or in other words the vast proportion of it that enters into its make, that azot derives the name of nitrogen

This gas may be procured by several different processes, and by all the methods which have been used in eudiometry, or the analysis of common air If a quantity of iron filings and sulphur, mixed together, and moistened with water be put into a glass vessel full of air, and inverted over water it will absorb all the oxygen in the course of a few days, but a considerable residuum of air will still remain incapable of further diminution this is azotic gas, though not perfectly pure If phosphorus be used instead of iron filings and sulphur, the effect takes place more speedily, the absorption

being completed in less than twenty four hours. Berthollet's method, if cautiously employed, will yield very pure gas. Very dilute nitric acid is poured upon a piece of muscular flesh, or the coagulum of blood, and a gentle heat of about 100° Fahrenheit is applied. The animal matter gives out in considerable quantity, and great purity, azotic gas, which may be received in vessels contrived for the purpose, and which are described under the article GAS.

The principal qualities of azotic gas are as follow. It is invisible and elastic like common air, and capable, like it too, of indefinite condensation and expansion. It immediately extinguishes a lighted candle and all other burning substances: hence the reason why a candle is extinguished in atmospherical air, as soon as the oxygen near it is consumed. It has no sensible taste, but is exceedingly noxious to animals; if compelled to respire it, they drop down dead almost instantly: some plants, however, live in it, and even flourish. It is not absorbed by water, but is capable of combining with oxygen, and with different proportions of this substance forms atmospheric air, gaseous oxyd of azot, or nitrous oxyd, nitrous gas, nitrous acid, and nitric acid, as may be seen under their names. It is capable of dissolving sulphur, phosphorus, and charcoal in minute quantities. It unites to hydrogen under certain circumstances, and constitutes with it ammonia. Very little is known concerning the action of azot in its simple form upon metallic or saline substances, and in the state of gas it appears to be more inactive and unwilling to enter into combination than any other substance in nature. It was discovered in 1772, by Dr Rutherford, of Edinburgh, and many of its properties were ascertained by Cavendish, Kirwan, and Priestley.

AZOT (Gaseous oxyd of). See NITROUS OXYD.

AZURE. *a.* (*azur*, French.) Blue, faint blue (*Newton*).

AZURE, in mineralogy and the arts, a name formerly applied to lapis lazuli, or azure stone, and the blue colour prepared from it: but is now used to denote the blue extracted from cobalt. The former is generally called ultramarine, and the latter has also the name of smalt.

AZURE DE CUIVRE, or MOUNTAIN BLUE, an ore of copper, containing that metal in a state of combination with the carbonic acid, and therefore technically denominated blue carbonat of copper.

AZURE, in heraldry, the blue colour in the arms of any person below the rank of a baron. In the escutcheon of a nobleman, it is called sapphire; and in that of a sovereign prince, Jupiter. In engraving this colour is expressed by lines or strokes drawn horizontally. This colour may signify justice, perseverance, and vigilance, when compounded with

Or	it signifies	Cheerfulness
Arg		Vigilance
Gul		Readiness
Ver		Enterprise
Pur		Goodness
Sab		Mournfulness

AZURITE. See LAZULITH.

AZYGOS (ἄζυγος, from α priv. and ζυγός, *a yoke*, because it has no fellow.) Several muscles, veins, bones, &c. are so called on this account.

AZYGOS VEIN. Vena azygos. Vena sine pari. This vein is situated in the right cavity of the thorax, upon the dorsal vertebræ. It receives the blood from the vertebral, intercostal, bronchial, pericardiac, and diaphragmatic veins, and evacuates it into the vena cava superior.

AZYMITES, in theology, those who communicate in bread not leavened, or fermented. This appellation is given by Cerularius to those of the Latin church, upon his excommunicating them in the eleventh century.

AZYMOUS. *a.* Unfermented, or made without leaven, as unleavened bread. Sea-biscuit is of this kind.

B.

B, THE second letter of the English and most other alphabets It is the first consonant, and first mute, and its pronunciation is supposed to resemble the bleating of a sheep B is also one of those letters which are called labial, because the principal organs employed in its pronunciation are the lips It is pronounced by pressing the whole length of them together, and forcing them open with a strong breath It has a near affinity with the other labials P and V, and is often used for P by the Armenians and other orientals, as in Betrus for Petrus

As a numeral, B was used by the Greeks and Hebrews to denote 2, but among the Romans for 300, and with a dash over it (thus B̄) for 3000

B is also used as an abbreviation Thus B A stands for bachelor of arts B L for bachelor of laws, and B D for bachelor of divinity B F in the preface to the decrees or senatus consulta of the old Romans signified *bonum factum* In music B stands for the tone above A as B♭, or ♭B, does for B flat, or the semi tone major above A B also stands for bass, and B C for *basso continuo*, or thorough bass

B and P have so near a relation one to another, that Quintilian tells us that in *obtinuit* reason requires a *b*, while in fact we hear the sound of *p*, as *optinuit* This is the cause that in ancient inscriptions and old glossaries these two letters are often put one for the other, as *apsens*, for *absens*, *obtimus*, for *optimus*, *pleps*, for *plebs*, *poplicus*, for *publicus*, and the like Hence it is, that we still write *suppono* for *subpono*, *oppono* for *obpono*, and several nations often pronounce one of these letters for the other, as the Germans who say, *ponum vinum*, for *bonum vinum*, and the like

The Greeks often change these two letters one for the other, and Plutarch assures us it was usual with the priests of Delphos to say, βαλεῖν for παλεῖν, and βικρὸν for πικρὸν From whence it comes to pass, that as often as it follows an *s*, we still change *b* into *p*, *scribo*, *scripsi*, as the Greeks say, λείβω, λείψω, &c B, says Priscian, can never be put before S in any syllable

It is in conformity to this use that the Latins have taken *pasco* from βόσκω, *papæ* from βαβαί, *buxus* from πύξος, *pedo* from βδέω, *puteus* from βυθός, and the like, as the Greeks have taken πύργος, *turris*, from the Phœnician word *bourg*

It is also common to these two letters to creep into words without occasion, as *absporto* for *asporto*, *obstendit* for *ostendit*, *obstentui* for *ostentui*, and hence it comes, that from *uro*, we say *comburere* and according to Nonnius, *celebre* is used for *celere*

B has also a great similitude with V consonant and hence it is, that when words are changed into another language they are often taken one for another, as βίος *vita* βία *vis*, βούλω *volo*, βαίνω *venio*, βαδίζω *vado* βόσκω, *vescor* βοή, *vox* βέρος, *vorax*, βιόω, *vivo*

From hence also it comes that the Greeks sometimes translate those Latin words by a B that begin with V as βαλήρ for *valere*

Yet this affinity of B with V does but little favour the pronunciation of the Spaniards and Gascoiners who always pronounce V for B and B for V

And although this error be no small one, yet it is more ancient than is commonly thought, for not only Adamantius speaks very particularly of it in Cassiodorus, but we meet with many examples of it upon old marble as BASE for VASE, CIBICA for CIVICA and in like manner V is put for B, VENEFICIUM for BENEFICIUM SIBE for SIVE And in the Pandects of Florence, *avocolo* for *abcolo* VOBEM for BOVEM, VESTIAS for BESTIAS, and the like

But besides this resemblance that B has with V consonant, it has the same with F or Φ, for we say Bruges for Fruges, as Cicero observes, from βρέμω comes *fremo*, and on the contrary we say, *sifilare* for *sibilare*, from whence comes the French word *siffler* *af nolis* is used for *ab nolis*, and we still write *suffero* for *subfero*, *sufficit* for *subficit*, and *suffusio* for *subfusio* And according to Festus, *album* is derived of ἀλφὸν a sort of white scurf, or rough tetter, and from ἀμφω comes *ambo*

BA, in geography a town of Africa, in Ardren, on the Slave coast

To BAA v n (*balo*, Lat) To cry like a sheep

BAA s (from the verb) The cry of a sheep

BAADEN, in geography See BADEN.

BAAL the same as Bel or Belus, an idol of the Chaldeans and Phœnicians, or Canaanites The former worshipped Mars under this name, according to Josephus, who, speaking of Thurus the successor of Ninus, says, "To this Mars the Assyrians erected the first statue, and worshipped him as a god, calling him Baal" It is probable the Phœnicians worship-

ped the sun under the name of Baal, for Josiah, willing to make some amends for the wickedness of Manasseh in worshipping Baal and all the host of heaven, put to death the idolatrous priests that burnt incense unto Baal. The temples consecrated to this god are called in the Scripture Chamanim, which signifies places inclosed with walls in which was kept a perpetual fire. The word baal, in the Punic language, signifies lord or master, and doubtless meant the Supreme Deity, the Lord and Master of the universe. It is often joined with the name of some false god, as Baal-berith, Baal-peor, Baal-zephon, &c.

BAAL BERITH, the god of the Shechemites. Bochart conjectures, that Berith is the same as Beroe, the daughter of Venus and Adonis, who was given in marriage to Bacchus, and that he gave her name to the city of Berith in Phœnicia, and became afterwards the goddess of it.

BAALIM, in ancient mythology, inferior deities among the Phœnicians.

BAAL PEOR, BAAL PHEGOR, or BEELPHEGOR, an idol of the Moabites and Midianites. We are told that Israel joined himself to Baal-peor, and that Solomon erected an altar to this idol upon the mount of Olives. Baal peor has been supposed to be no other than a Priapus, and that the worship of him consisted in the most obscene practices. Selden imagines that Baal peor is Pluto, founding his conjecture on Psalm cvi. 28. where it is said, "They joined themselves unto Baal-peor, and ate the offerings of the dead." The sacrifices to which these words refer were, as Selden thinks, offered to appease the manes of the dead.

BAAL ZEBUB, BEEL ZEBUB, or BEELZEBUB, the idol, or god of the Ekronites. In Scripture he is called the Prince of Devils. His name is rendered the Lord of Flies, or the God fly, which some think was a mock appellation bestowed on him by the Jews. He had a famous temple and oracle at Ekron. The worship of this false god must have prevailed in our Saviour's time, since the Jews accused him of driving out devils in the name of Belzebub their prince.

BAAL-ZEPHON, in scripture geography, a place opposite to Pihahiroth, where the Israelites encamped before they passed the Red sea. In the opinion of Bruce (Travels, vol. i. p. 233.), Baal zephon was probably some idol's temple, which served for a signal house upon the cape which forms the north entrance of the bay, opposite to Jibbel Attakah, near Suez, where there is still a mosque or saint's tomb.

BAAR, a landgraviate in the south west part of the circle of Suabia.

BAAS. Bos barbatus. See BOS.

BABA CAPE, in geography, a cape of Natolia in Asia Minor, between the islands of Tenedos and Lesbos, near the gulf of Adramytti. Lat. 39. 33. N. Lon. 26. 22. E.

BABA, the Russian name of the pelican.

To BA'BBLE. *v. n.* (*babbelen*, German.) 1. To prattle like a child (*Prior*). 2. To talk idly, or irrationally (*Prior*). 3. To tell secrets (*L'Estrange*). 4. To talk much (*Prior*).

BA'BBLE. *s.* (*babil*, Fr.) Idle talk, senseless prattle (*Shakspeare*).

BA'BBLEMENT. *s.* (from *babble*.) Senseless prate, empty words (*Milton*).

BA'BBLER. *s.* (from *babble*.) 1. An idle talker (*Rogers*). 2. A teller of secrets (*Spenser*).

BABBLER, a hound upon whose tongue no firm reliance is to be made, either in drag, upon trail, or the recovery of a fault during the chase.

BABE. *s.* (*baban*, Welsh.) An infant, a child of either sex (*Dryden*).

BABEL, a city and tower undertaken, as the holy Scriptures relate, to be built by the whole human race soon after the flood, and remarkable for the miraculous frustration of the attempt by the confusion of languages. Most authors are of opinion that it was situated exactly in the place where the celebrated city of Babylon afterwards stood. Authors have been much divided about the motive by which the whole race of mankind were induced to join as one man in such an undertaking. Oriental writers say, that the city was 313 fathoms in length, and 151 in breadth, that the walls were 5533 fathoms high, and 33 in breadth, and that the tower itself was no less than 10 000 fathoms, or 12 miles high.

Babel began building 2247 before Christ, and continued building forty years, when God confounded the builders language, and dispersed them into different nations. From thence arose the difference of languages, the dispersion of the people, and the forming of empires. From Japhet, Noah's eldest son, sprang the inhabitants of the north of Europe and Asia, as well as those of the west. From Shem came the people of the east, as also those of Israel, and from Ham descended the Canaanites, Philistines, Egyptians, and the ancient possessors of Africa. See CONFUSION OF LANGUAGES.

BABEL MANDEB, or BABEL MANDEL, i. e. the gate of mourning, a famous streight in the Indian Ocean between the coast of Arabia Felix in Asia, and that of Adel and Zeila in Africa, at the entrance of the Red Sea. It is by some called the streights of Mocha, because Mocha lies on the Asiatic shore.

BABEL MANDEL, a small island at the mouth of the streight of Babel Mandel, belonging to Ethiopia. It is little more than a barren rock, not more than five miles in circumference. It was formerly an object of great contention between the Ethiopians and Arabians, but has been of little importance since the discovery of a passage to the East Indies by the Cape of Good Hope. Lat. 12. 40. N. Lon. 44. 30. E.

BA'BERY. *s.* (from *babe*.) Finery to please a babe or child (*Sidney*).

BABINA (Commonwealth of), a society ludicrously so called, which was founded in

Poland in the reign of Sigismund-Augustus, in the 16th century. It took its rise from a set of gentlemen, inhabitants of Lublin, who had agreed to meet at a place called Babina, merely for the purposes of mirth and jollity. They rendered vice and folly ridiculous, by a sham promotion of certain persons to mock dignities and appointments under a fictitious commonwealth or government. Never did any institution of this nature become so general or so useful; but at length the society degenerated into a set of buffoons, and banterers of every thing sacred or profane.

BA'BISH. *a.* (from *babe*.) Childish. (*Ascham*.)

BABOON, in zoology. See SIMIA.

BABUYANES, a cluster of six or seven small islands, about ten leagues north of the isle of Luçon, in the Pacific Ocean. One of them contains about 500 inhabitants: the chief produce is wax, ebony, bananas, cocoas, and plantains.

BABUYCA, a town of North America in the province of Culiacan, sixty-five miles NNE Culiacan.

BABUZICA'RIUS (βαβουζικαριος, from βαβαζω, *to babble*, or *speak inarticulately*.) The incubus ephialtes or night mare: so called because in this disorder the person is apt to make an inarticulate and confused noise.

BA'BY. *s.* (see BABE.) 1. A child; an infant. (*Locke*.) 2. A small image in imitation of a child. (*Bacon*.)

BABYLON, the capital of the ancient kingdom of Babylonia or Chaldea, and supposed to have stood in E. lon. 44. 30. N. lat. 33. 20. Semiramis is said by some, and Belus by others, to have founded this city. But by whomsoever it was founded, Nebuchadnezzar was the person who put the last hand to it, and made it one of the wonders of the world. Yet it plainly appears that this city was never wholly inhabited. It never had time to grow up to what Nebuchadnezzar visibly intended to have made it; for, Cyrus removing the seat of the empire soon after to Shushan, Babylon fell by degrees to utter decay. Many of the moderns are of opinion that the extravagant descriptions given of Babylon by ancient writers are very far from being true; although it is certain that few other arguments can be brought against the reality of them than that we do not see things of a similar kind executed in our own days.

This capital was, according to Herodotus (who was himself at Babylon), surrounded with walls, in thickness 87 feet, in height 350 feet, and in compass 480 furlongs, or 60 of our miles. It is observed, that those who give the height of these walls but at 50 cubits speak of them only as they were after the time of Darius Hystaspis, who had caused them to be beaten down to that level. These walls formed an exact square, each side of which was 120 furlongs, or 15 miles in length, and were all built of large bricks cemented together with bitumen, which in a short time grows harder than the very brick and stone which it cements. The city was encompassed, without the walls, with a vast ditch filled with water, and lined with bricks on both sides; and, as the earth that was dug out of it served to make the bricks, we may judge of the depth and largeness of the ditch from the height and thickness of the walls. In the whole compass of the wall there were 100 gates, that is, 25 on each of the four sides, all made of solid brass. Between every two of these gates, at proper distances, were three towers, and four more at the four corners of this great square, and three between each of these corners and the next gate on either side; and each of these towers was ten feet higher than the walls. But this is to be understood only of those parts of the wall where towers were needful for defence. For some parts of them being upon a morass, and inaccessible by an enemy, there the labour and cost was spared: which, though it must have spoiled the symmetry of the whole, must be allowed to have savoured of good economy; though that is what one would not have expected from a prince who had been so determined, as Nebuchadnezzar must have been, to make the city complete both for strength and beauty. The whole number then of these towers, amounted to no more than 250, whereas a much greater number would have been necessary to have made the uniformity complete all round. From the 25 gates in each side of the square, there was a straight street extending to the corresponding gate in the opposite wall; whence the whole number of the streets must have been but 50; but then they were each about 15 miles long, 25 of them crossing the other 25 exactly at right angles. Besides these whole streets, we must reckon four half streets which were but rows of houses facing the four inner sides of the wall. These four half streets were properly the four sides of the city within the walls, and were each of them 200 feet broad; the whole streets being about 150 of the same. By this intersection of the 50 streets, the city was divided into 676 squares, each of four furlongs and a half on each side, or two miles and a quarter in compass. Round these squares on every side toward the streets stood the houses, all of three or four stories in height, and beautified with all manner of ornaments; and the space within each of these squares was all void, and taken up by yards, or gardens, and the like, either for pleasure or convenience.

A branch of the Euphrates divided the city into two, running through the midst of it, from north to south; over which, in the very middle of the city, was a bridge a furlong in length, or rather more, and indeed much more, if we hearken to others, who say it was no less than five stades or furlongs in length, though but 30 feet broad, a difference we shall never be able to decide. this bridge, however, is said to have been built with wonderful art, to supply a defect in the bottom of the river, which was all sandy. At each end of this bridge were two palaces, the old palace on the east side, the new one on the west side of the

river, the former of which took up four of the squares above mentioned, and the latter nine. The temple of Belus, which stood next to the old palace, took up another of the same squares.

The whole city stood in a large flat or plain, in a very fat and deep soil. That part or half of it on the east side of the river was the old city, and the other on the west was added by Nebuchadnezzar; both being included within the vast square bounded by the walls aforesaid.

Nothing was more wonderful at Babylon than the hanging gardens, which Nebuchadnezzar made in complaisance to his wife Amyte, who being a Mede, and retaining a strong inclination for the mountains and forests of her own country, was desirous of having something like them at Babylon. They are said to have contained a square of four plethra, or 400 feet on each side, and to have consisted of terraces one above another carried up to the height of the wall of the city; the ascent from terrace to terrace being by steps ten feet wide. The whole pile consisted of substantial arches upon arches, and was strengthened by a wall surrounding it on every side, twenty two feet thick; and the floors on each of them were laid in this order: first, on the tops of the arches was laid a bed or pavement of stones sixteen feet long, and four feet broad; over this was a layer of reed mixed with a great quantity of bitumen, and over this two courses of brick closely cemented together with plaster; and over all these were thick sheets of lead, and on these the earth or mould of the garden. This floorage was designed to retain the moisture of the mould, which was so deep, as to give root to the greatest trees which were planted upon every terrace, together with great variety of other vegetables pleasing to the eye. Upon the uppermost of these terraces was a reservoir, supplied by a certain engine with water from the river, from whence the gardens on the other terraces were supplied.

The other works attributed to Nebuchadnezzar by Berosus and Abydenus, were the banks of the river, the artificial canals, and the great artificial lake said to have been sunk by Semiramis. The canals were cut out on the east side of the Euphrates, to convey the waters of that river when it overflowed its banks into the Tigris before they reached Babylon. The lake was on the west side of Babylon, and, according to the lowest computation, 40 miles square, 160 in compass, and in depth 35 feet, as we read in Herodotus, or 75, as Megasthenes will have it, the former, perhaps, measured from the surface of the sides, and the latter from the tops of the banks that were cast upon them. This lake was dug to receive the waters of the river while the banks were building on each side of it. But both the lake, and the canal which led to it, were preserved after that work was completed, being found of great use, not only to prevent all overflowings, but to keep water all the year, as in a common reservoir, to be let out, on proper occasions, by sluices, for the improvement of the land.

The banks were built of brick and bitumen, on both sides of the river, to keep it within its channel, and extended on each side throughout the whole length of the city, and even farther, according to some, who reckon they extended 160 furlongs or twenty miles, whence it is concluded they must have begun two miles and a half above the city, and have been continued an equal distance below it, the length of the city being no more than 15 miles. Within the city they were built from the bottom of the river, and of the same thickness with the walls of the city itself. Opposite to each street, on either side of the river, was a brazen gate in the said wall, with stairs leading down from it to the river: these gates were open by day, and shut by night.

BABYLON, in scripture history, is a name figuratively given by the sacred writers, especially by St Peter (1 Epist. ch. v. 13) and by St John (Revelations ch. xvii. and xviii.) and likewise by the fathers, to Rome, partly on account of her great pride and oppression of God's people, and partly for her resemblance to the ancient Babylon in idolatry, that kingdom so fully representing the idolatry of the church of Rome in the description given of it in the 6th chapter of Baruch, that scarcely any real difference between them can be observed. Whitby's Paraphrase, vol. ii. p. 661. and 773.

BABYLONIA, or CHALDÆA, a kingdom of Asia, and the most ancient in the world, being founded by Nimrod the grandson of Ham; who also, according to the margin of our bibles, founded Nineveh the capital of the kingdom of Assyria. Nothing certain is known concerning either of these, except what may be gathered from scripture.

BABYLONIAN, BABYLONIUS, is used in ancient writers for an astrologer, or any thing relating to astrology.

BABYLONICA TEXTA, a rich sort of weavings or hangings denominated from the city of Babylon, where the practice of interweaving divers colours in their hangings first obtained. Hence also Babylonic garments, Babylonic skins.

BABYLONICS, BABYLONICA, a fragment of the ancient history of the world, ending at 267 years before Christ, and composed by Berosus or Berossus a priest of Babylon, about the time of Alexander. Babylonics are sometimes also cited in ancient writers by the title of Chaldaics. The babylonics were very consonant with scripture, as Josephus and the ancient christian chronologers assert, whence the author is usually supposed to have consulted the Jewish writers. Berosus speaks of an universal deluge, an ark, &c.

BABYRUSSA, a species of the genus SIMA, which see. Inhabits the islands of the Indian Ocean, is gregarious, feeds on herbs and leaves, is of quick scent, swims and dives well, grunts, is of the size of a stag, and its flesh good for food.

BAC, in navigation, is used for a praam, or ferry-boat

BAC, or BACK, in brewing, a large flat kind of tub, or vessel, wherein the wort is put to stand and cool before boiling The ingredients of beer pass through three kinds of vessels They are mashed in one, worked in another, and cooled in a third called a back, or cooler

BACANTIBI in ecclesiastical history, wandering clerks who strolled from church to church

BACCA (from *Bacchus*, the inventor of wine, or rather from בכר, *bacca*, Heb) A berry

BACCÆ BERMUDENSES See SAPONARIÆ NUCULÆ

BACCÆ NORLANDICÆ The fruit of the rubus arcticus, foliis, alternatis, caule inermi unifloro of Linnéus They are recommended by Linnéus as possessing antiseptic, refrigerant, and antiscorbutic qualities

BACCARACH a town of the lower palatinate of the Rhine, in Germany, famous for its wine Lat 49 55 N Lon 7 52 E

BACCARIS Ploughman's spikenard In botany, a genus of the class syngenesia, order polygamia superflua Receptacle naked, down simple calyx imbricate cylindrical, female florets intermixed with the hermaphrodite florets Fourteen species spread over Asia, Africa, and America many of which are propagated in our own gardens by cuttings or seeds The cuttings should be planted on a shady border during the summer months but the seeds should be sown in the spring These shrubs if planted in a warm situation will live abroad in mild winters, but they are usually placed in green houses, and only entrusted abroad during summer

BACCATED a (*baccatus*, Lat) Beset with pearls, having many berries

BACCHANALIA, BACCHANALS, celebrated in honour of the god Bacchus, and which were called liberales, or orgiæ, or dionysiaca

The orgiæ, bacchanals, liberales, and dionysiaca are usually taken for the same, but there was a difference between those pagan ceremonies, for the feasts of liber, or liberia, were celebrated in honour of Liber or Bacchus every year on March the 17th, when the young men between 16 and 17 years old put off their garment bordered with purple, called prætexta, to take the toga virilis from the hands of the prætor with a surname, which made them capable of going to the war, and of the offices of the commonwealth But the bacchanals were kept every month, and the dionysiaca or orgia every three years, which gave them the name of trieterica

Macrobius, in the first book of his Saturnalia, chapter 18, having proved by good reasons that Bacchus and Apollo are but one thing, adds, that the bacchanals were celebrated every two years upon mount Parnassus, dedicated to Apollo and the Muses, where the Satyrs assisted

Authors refer the institution of the feast of Bacchus to the Athenians, which passed at first for very honest plays, and merriments among the pagans They carried a barrel of wine wound about with vine-branches loaded with grapes They drew an he goat by the horns, to sacrifice him with a basket full of figs and grapes, having their heads crowned with vine branches, and the bacchæ, which were the priests of that god, held in their hands staves twisted with ivy, dancing and wantonly playing in the streets, and crying evohe, that is to say, a happy life

But these feasts were in length of time changed into a licentious use of all sorts of debauchery

The bacchanalia were introduced into Rome by a stage player from Tuscany, and in a short time nearly rivalled in indelicacy and obscenity those observed in Greece Two of these feasts were particularly remarkable, and distinguished by the epithets greater and less The latter were held in the open fields during the autumn, but the former in the city, about the vernal equinox

BACCHANALIAN s (from *bacchanalia*, Latin) A drunkard

BACCHANALS s (*bacchanalia*, Lat) The drunken feasts of Bacchus (*Pope*)

BACCHANTES, priestesses of Bacchus, who are represented at the celebration of the orgies almost naked, with garlands of ivy, with a thyrsus and dishevelled hair Their looks are wild and they utter dreadful sounds, and clash different musical instruments together They are also called Thyades and Menades (*Ovid* &c)

BACCHARIS See BACCARIS

BACCHI, in mechanics, a kind of ancient machines in form of goats, used by Jupiter in his wars against the giants Rudbeck describes two kinds of bacchi, one made like the battering ram, wherewith Jupiter demolished the enemy's fortifications, the others contrived to cast fire out of, from whence the Greeks are conjectured to have framed their idea of chimera

BACCHIS or BALUS, king of Corinth, succeeded his father Prumnides His successors were always called bacchidæ, in remembrance of the equity and moderation of his reign The bacchidæ increased so much, that they chose one of their number to preside among them with regal authority Cypselus overturned this institution, by making himself absolute (*Stal*)

BACCHIUS and BITHUS, two celebrated gladiators of equal age and strength, whence the proverb to express equally, Bithus contra Bacchium (*Horat*)

BACCHIUS, in ancient poetry, a kind of foot composed of a short syllable and two long ones, as the word ăvări It takes its name from the god Bacchus, because it frequently entered into the hymns composed in honour of him

BACCHUS, in mythology, was son of Jupiter and Semele, the daughter of Cadmus After she had enjoyed the company of Jupiter, Semele was deceived, and perished by the arti-

fice of Juno, who assumed the shape of Beroe, Semele's nurse, and persuaded Semele that the lover whom she entertained was not Jupiter, but a false lover, and that to prove his divinity she ought to beg of him, if he really were Jupiter, to come to her bed with the same majesty as he courted the embraces of Juno. The artifice succeeded, and when Jupiter promised his mistress whatever she asked, Semele required him to visit her with all the divinity of a god. Jupiter was unable to violate his oath; and Semele, unwilling to retract it, therefore, as she was a mortal, and unable to bear the majesty of Jupiter, she was consumed, and reduced to ashes. The child, of which she had been pregnant for seven months, was with difficulty saved from the flames, and put in his father's thigh, where he remained the full time he naturally was to have been in his mother's womb. From this circumstance Bacchus has been called Bimater. There are different traditions of the manner of his education, which shew that there have been many of the same name. Diodorus speaks of three of this name, and Cicero of a greater number; but among them all, the son of Jupiter and Semele seems to have obtained the merit of all the rest. This personage is seldom named in modern times but as a sensual encourager of feast and jollity; but he was regarded in a more respectable light by the ancients who worshipped him in different countries under the following appellations: in Egypt, he was called Osiris; in Mysia, Fanaces; in India, Dionysius; Liber, throughout the Roman dominions; Adoneus in Arabia; and Pentheus, by the Lucanians. Mythologists furnish reasons for all these different names given to the same god; which may be seen in the second volume of Banier's Mythology.

It is natural to suppose that the Greeks and Romans, as usual, bestowed upon the one Bacchus which they worshipped the several actions and attributes of the many divinities known by that name and by other equivalent denominations in different countries. However, antiquity chiefly distinguished two gods under the title of Bacchus: that of Egypt, the son of Ammon and the same as Osiris; and that of Thebes in Bœotia, the son of Jupiter and Semele.

The Egyptian Bacchus was brought up at Nysa, a city of Arabia Felix, whence he acquired the name of Dionysius, or the god of Nysa; and this was the conqueror of India. Though this Bacchus of the Egyptians was one of the elder gods of Egypt, yet the son of Semele was the youngest of the Grecian deities. Diodorus Siculus tells us, that Orpheus first deified the son of Semele by the name of Bacchus, and appointed his ceremonies in Greece, in order to render the family of Cadmus, the grandfather of the Grecian Bacchus, illustrious.

The great Bacchus, according to sir Isaac Newton, flourished but one generation before the Argonautic expedition. This Bacchus, says Hermippus, was potent at sea, conquered eastward as far as India, returned in triumph, brought his army over the Hellespont, conquered Thrace, and left music, dancing, and poetry, there. And, according to Diodorus Siculus, it was the son of Semele who invented farces and theatres, and who first established a music-school, exempting from all military functions such musicians as discovered great abilities in their art; on which account, says the same author, musicians formed into companies have since frequently enjoyed great privileges.

Dr Burney observes, that the dithyrambics which gave birth to dramatic representations, are as ancient as the worship of Bacchus in Greece; and there is little doubt that the ceremonies of his mysteries gave rise to the pomp and illusions of the theatre. Many of the most splendid exhibitions upon the stage for the entertainment of the people of Athens and Rome being performed upon the festivals of Bacchus, gave occasion to the calling all those that were employed in them, whether for singing, dancing, or reciting, servants of Bacchus.

BACCHUS BONE, *s.* A flower, not tall, but very full and broad-leaved. (*Mortimer.*)

BACCIFEROUS, *a.* (from *bacca* and *fero*, Lat.) Berry bearing. (*Ray.*)

BACCINIUM, in antiquity, a bason or vessel to hold water for washing the hands.

BACH (John Sebastian), an eminent German musician, was born at Eisenach in 1685. At the age of 18 he was chosen organist of the new church of Anhalt. In 1708 he became musician to the duke of Saxe Weimar, and obtained a victory at Dresden over a famous French organist, who had challenged all the German musicians. He is reckoned to have been equal to Handel on the organ, and his compositions are in the first style of excellence. He died at Leipsic in 1754. His sons, Charles, Emanuel, and John, were also greatly celebrated as performers and composers in music; the former was living at Hamburg in 1773, and the other was in England in 1763. (*Wat.*)

It was observed by Abel, that if Sebastian Bach, and his admirable son Emanuel, instead of being music directors in commercial cities, had been employed to compose for the stage and public of great capitals, such as Naples, Paris, or London, and for performers of the first class, they would doubtless have simplified their style more to the taste of their judges, and would have been among the greatest musicians of the eighteenth century.

BACHELOR, or BATCHELOR, a common term for a man not married, or who is yet in a state of celibacy. The Roman censors frequently imposed fines on old bachelors. Dion of Halicarnassus mentions an old constitution, by which all persons of full age were obliged to marry. But the most celebrated law of this kind was that made under Augustus, called the Lex Julia de maritandis ordinibus; by which bachelors were made incapable of legacies or inheritances by will, unless from their near relations. The Rabbins maintain,

that, by the laws of Moses, every person, except some few, are obliged in conscience to marry at twenty years of age: this makes one of their 613 precepts. Hence those maxims so frequent among their casuists, that he who does not take the necessary measure to leave heirs behind him, is not a man, but ought to be reputed a homicide. Lycurgus was not more favourable by his laws, bachelors are branded with infamy. In England, there was a tax on bachelors, after 25 years of age, 12*l* 10s for a duke, a common person 1s by 7 Will III 1695. In Britain, at present they are taxed by a double duty on their male servants. Thus every man of the age of 21 years and upwards never having been married who shall keep one male servant or more, shall pay 1*l* 10s for each, above or in addition to the ordinary duties leviable for servants.

BACHELOR was anciently a denomination given to those who had attained to knighthood, but had not a number of vassals sufficient to have their banner carried before them in the field of battle, or, if they were not of the order of bannerets, were not of age to display their own banner, but obliged to march to battle under another's banner. It was also a title given to young cavaliers who, having made their first campaign, received the military girdle accordingly. And it served to denominate him who had overcome another in a tournament the first time he ever engaged.

There is scarcely any word whose origin is more controverted among the critics than that of bachelor, baccalarius or baccalaureus: the two different acceptations of the word, literary and military, above recited, have each of them their advocates who assert each to be the primitive sense, and derive the word accordingly.

Among those who hold the military bachelor to be the more ancient, is Cujas, who derives the word from buccellarius, a kind of cavalry, anciently in great esteem. Du-Cange deduces it from baccalaria, a kind of fees, or farms, consisting of several pieces of ground, each whereof contained 12 acres or as much as two oxen would plough, the possessor of which baccalaria were called bachelors.

Caseneuve, and Altaserra derive bachelor from baculus, or bacillus, a staff, because the young cavaliers exercised themselves in fighting with staves. Martinius derives it from baccalaureus, i e bacca laurea donatus, in allusion to the ancient custom of crowning poets with laurel berries, bacca lauri, as was the case with Petrarch at Rome in 1341. Alciat and Vives are of the same opinion, nor is this etymology improbable.

BACHELORS, in the livery companies in London, are those not yet admitted to the livery. These companies generally consist of a master, two wardens, the livery, and the bachelors, who are yet but in expectation of dignity in the company, and have their function only in attendance on the master and wardens: they are also called yeomen.

BACHELORS, *knights*, were so called, as being the lowest order of knights, or inferior to bannerets.

BACHELORS, in a university sense, are persons that have attained to the bacca laureat, or who have taken the first degree in the liberal arts and sciences. Before a person can be admitted to this degree at Oxford, it is necessary that he study there four years, three years more may entitle him to the degree of master of arts, and in seven years more he may commence bachelor of divinity. At Cambridge the degrees are usually taken much the same as at Oxford, excepting in law and physic, in either of which the bachelor's degree may be taken in six years. In France, the degree of bachelor of divinity is attained in five years study, that is, in two years of philosophy, and three of divinity.

BACHELOR, in music, one who has taken his first degree in music. A qualification formerly required of a candidate for this honour, was the being able to read and expound certain books in Boethius, a Greek writer on the science of the sixth century. It is now required of the candidate to compose an exercise for voices and instruments, in six parts, which exercise must be publicly performed in the music school, or other place in the university.

BACHELORSHIP *s* (from *bachelor*) The condition of a bachelor (*Shakspeare*)

BACHER'S PILLS. A celebrated medicine in France for the cure of dropsies. Their principal ingredient is the extract of the melampodium, or black hellebore.

BACHIAN one of the Moluccas, or Clove islands, in the East Indies. Lat 0 25 S Lon 125 5 E

BACILLARIA. In zoology, a genus of the class vermes, order infusoria. Body consisting of cylindrical, straw-like filaments placed parallel to each other, and frequently changing their position. One species only—b paradoxa. Found on the ulva latissima (a species of the order algæ or flags), body composed of from five to forty linear yellowish short filaments, united together, forming themselves into a square, zigzag, or extended line, but always preserving their parallelism and resting in a

BACK *s* (bac, bec, Saxon) 1 The hinder part of the body. 2 The outer part of the hand when it is shut, opposed to the palm (*Donne*). 3 Part of the body which requires clothes (*Locke*). 4 The rear (*Clarendon*). 5 The place behind (*Dryden*). 6 The part of any thing out of sight (*Bacon*). 7 The thick part of any tool opposed to the edge (*Arbuthnot*).

BACK *ad* (from the noun) 1 To the place whence one came (*Raleigh*). 2 Backward (*Addison*). 3 Behind, not coming forward (*Blackmore*). 4 Toward things past (*Burnet*). 5 Again, in return (*Shakspeare*). 6 Again, a second time (*Dryden*).

To BACK *v a* 1 To mount a horse (*Shakspeare*). 2 To break a horse (*Rosc*). 3 To place upon the back (*Shakspeare*). 4

To maintain, to strengthen (*South*) 5 To justify, to support (*Boyle*) 6 To second (*Dryden*)

BACK, in the manage and among farriers, is a common term of peculiar meaning A horse's back to be good and valuable should be straight instead of hollow, which last is called saddle backed Saddle backed horses are generally light and carry their heads high but are deficient in strength and service A horse with a weak back is apt to stumble

Back galled This is an excoriation of the hair and cuticle to which horses (and especially young ones) are very subject from being ridden too far, and too speedily, or which is more commonly the case, from carrying a saddle that does not fit the back and consequently presses more in some parts than in others In the last case it may be observed before the excoriation is actually produced by noticing that certain parts of the back under the saddle are in a more violent sweat than other parts The disease is to be avoided by avoiding the causes The saddle that best agrees with a young horse should be easy and pretty large in the seat, and the pannel and stuffing should so far correspond with the shape of the back that the saddle may press equably upon every part at the same time

If the gall be produced on a journey and the horse cannot be rested till it have healed the crupper should be altered a hole or two every morning till the saddle is drawn so far backwards as to vary the seat of chief pressure At the same time the horse's back should be cooled every time he is baited washed with warm water, salt and water with extract of saturn, or, as it is now called, aqua lithargyri acetati, or with alkohol and water Under this regimen with care the excoriation will heal in the midst of travelling, provided the original cause be not persevered in, in other words that the saddle be not suffered to possess an unequal pressure or the load be not continued excessive

To BA'CKBITE *v a* (from *back* and *bite*) To censure or reproach the absent (*Shaksp*)

BA'CKBITER *s* (from *backbite*) A privy calumniator a censurer of the absent (*South*)

BA'CKBONE *s* (from *back* and *bone*) The bone of the back See VERTEBRÆ

BACKCA'RRY *s* The act of having on the back (*Cowell*)

BACKDOOR *s* (from *back* and *door*) The door behind the house (*Bacon*)

BA'CKED *a* (from *back*) Having a back (*Dryden*)

BA'CKFRIEND *s* (from *back* and *friend*) An enemy in secret (*South*)

BACKGAMMON *s* (from *bach gammon*, Welsh, a little battle) An ingenious and interesting game, of uncertain origin, played by two persons with a box and dice, upon a square table divided into two parts, upon which are placed twelve white and twelve black points or divisions Each adversary has fifteen men or counters, those of the one white and of the other black by way of distinction, which are to be thus situated If the player play into the right hand table, two are to be placed on the ace point in his adversary's table five upon the cinque point in the opposite table, three upon the cinque point in the hithermost table, and five on the cinque point in his own table His adversary's men are to be placed exactly opposite his own, and the grand object for either is to bring the men that respectively belong to them round into their own tables All throws that contribute towards this and prevent the adversary from doing the same are advantageous, and *vice versa*

*Directions for playing all the throws on the dice at setting out, whether for a gammon, or single hit in which the reader must observe that the mark † implies for a gammon only, and the mark * a hit only*

1 Let the player play two aces on his cinque-point and bar point for either gammon or hit

2 Two sixes are to be played on his adversary's bar point and on his own bar point, for a gammon, or hit

3 * Two trois two to be played on his cinque-point, and the other two on the trois point in his own tables for a gammon only

4 † Two deuces to be played on the quatre-point in his own tables and two to be brought over from the five men placed in his adversary's tables, for a gammon only

5 † Two fours to be brought over from the five men placed in his adversary's tables, and to be put upon the cinque point in his own tables, for a gammon only

6 Two fives to be brought over from the five men placed in his adversary's tables, and to be put upon the trois point in his own tables, for a gammon, or hit

7 Six ace, let him here take his bar point, for a gammon or hit

8 Six deuce a man to be brought from the five placed in his adversary's tables, and to be placed on the cinque point in his own, for a gammon or hit

9 Six and three a man to be brought from his adversary's ace-point, as far as he will go for a gammon or hit

10 Six and four a man to be brought from his adversary's ace point, as far as he will go, for a gammon, or hit

11 Six and five a man to be carried from his adversary's ace point, as far as he can go, for a gammon or hit

12 Cinque and quatre, a man to be carried from his adversary's ace point, as far as he can go, for a gammon, or hit

13 Cinque trois, let him make the trois-point in his tables, for a gammon or hit

14 Cinque deuce play two men from the five placed in your adversary's tables, for a gammon, or hit

15 * Cinque-ace, bring one man from the five placed in your adversary's tables for the cinque, and play one down on the cinque point in your own tables for the ace, for a gammon only

16 Quatre trois, bring two men from the five placed in your adversary's tables, for a gammon, or hit

17 Quatre deuce, make the quatre-point in your own tables, for a gammon, or hit

18 † Quatre-ace, play a man from the five placed in your adversary's tables for the quatre, and for the ace play a man down upon the cinque-point in your own tables, for a gammon only

19 Trois-deuce, bring two men from the five placed in your adversary's tables, for a gammon only

20. Trois-ace, make the cinque-point in your own tables, for a gammon, or hit

21 * Deuce-ace, play one man from the five placed in your adversary's tables for the deuce, and for the ace play a man down upon the cinque-point in your own tables, for a gammon only

22 * Two trois, play two of them on the cinque-point in your own, and with the other two take the quatre-point in your adversary's tables

23 † Two deuces, play two of them on the quatre point in your own and with the other two take the trois-point in your adversary's tables

By playing the two foregoing cases as directed the player avoids being shut up in his adversary's tables, and has the chance of throwing high doublets, to win the hit

24 * Two fours, two of them are to take your adversary's cinque point in his tables, and for the other two bring two men from the five placed in your adversary's tables

25 * 1 Cinque ace, play the cinque from the five men placed in your adversary's tables, and the ace from your adversary's ace point

26 * 2 Quatre ace, play the quatre from the five men placed in your adversary's tables, and the ace from those on your adversary's ace point

27 * 3 Deuce ace, play the deuce from the five men placed in your adversary's tables, and the ace from your adversary's ace-point

The three last chances are to be played in this manner, because, by laying an ace down in your adversary's tables, you have a probability of throwing deuce ace, trois deuce, quatre trois, or six-cinque, in two or three throws, in any of which cases you are to make a point which gives you the better of the hit, and observe by the directions given in this chapter that you are to play nine chances out of the thirty-six in a different manner, for a single hit, to what you would do when playing for a gammon

Hints and cautions —By the rules given to play for a gammon, you are voluntarily to make some blots, the odds being in your favour that they are not hit, but should that happen, and you have three men in your adversary's tables you must endeavour to secure your adversary's cinque, quatre, or trois point, to prevent a gammon, and must be very cautious how you suffer him to take up a fourth man Take care not to crowd your game, by putting many men either upon your trois or deuce point in your own tables, which is, in effect, to lose those men by not having them in play Besides, by crowding your game, you are often gammoned, as when your adversary finds your game open, by being crowded in your own tables he may then play as he thinks fit

The following calculations will show the odds of entering a single man upon any certain number of points, and also give you the odds for and against being hit by double dice, consequently you can choose the method of play most to your advantage If it be necessary to make a run, in order to win a hit, and you would know who is forwardest, begin with reckoning how many points you must have to bring home to the six-point in your tables the man that is at the greatest distance, and do the like by every other man abroad, when the numbers are summed up, add for those already on your own tables (supposing the men that were abroad as on your six point for bearing) viz six for every man on the six, and in like manner respectively for the whole Compare this with your adversary's numbers, and you will form a true statement of the game The first best throw upon the dice is esteemed aces, as it stops the six point in the outer table, and secures the cinque in your own, whereby your adversary's two men upon your ace point cannot get out with either quatre, cinque or six Whence this throw is an advantage frequently asked and given between players that are not equally skilful

By the ensuing tables it will appear, that the numbers which may be thrown with two dice are 294, that the chances upon two dice are 36, and consequently that the mean number you may expect with every throw is about 8

The numbers may be calculated thus

2 Aces	4	5 and 4 twice	18
2 Deuces	8	5 3	16
2 Trois	12	5	14
2 Fours	16	5	12
2 Fives	20	4	14
2 Sixes	24		12
6 and 5 twice	22	4	10
	20		10
	18		8
			6
	14		—Points

Divided by 36 { 294 / 288 } 8

294 divided by 36, shows that one throw with another you may expect 8 upon two dice

The chances upon two dice are as follow

2 Sixes	1	5 and 4 twice	2
2 Fives	1	5 3	2
2 Fours	1	5 2	2
2 Trois	1	* 5 1	2
2 Deuces	1	4 3	2
2 Aces	1	4 2	2
6 and 5 twice	2	* 4 1	2
6 4	2	3 –	2
6 3	2	* 3 1	2
6 2	2		
			36

To find out by this table what are the odds of being hit upon a certain or flat die, look in the table where the mark * will indicate it

* 2 Aces	1	* 3 1 twice	2
* 6 and 1 twice	2	* 4 1	2
* 5 1	2	* 2 1	2

Total 11

Which deducted from 36

The remainder is 25

By this it appears, that it is 25 to 11 against hitting an ace, upon a certain, or flat die The like method may be taken with any other flat die, as with the ace

Q What are the odds of entering a man upon 1, 2, 3, 4, or 5 points?

	Answer for	against		*Reduced* for	against
To enter it upon 1 point is	11 to	25	or about	4 to	9
2	20	16		5	4
3	27	9		3	1
4	32	4		8	1
5	35	1		35	1

What are the odds of hitting, with any chance, in the reach of a single die?

	Answer for	against		Reduced for		against
upon 1 is	11 to	25	or about	4	to	9
2	12	24		1		2
3	14	22		2		3
4	15	21		5		7
5	15	21		5		7
6	17	19		8½		9½

What are the odds of hitting with double dice?

	Answer for		against		Reduced for		against
upon 7 is	6	to	30	or about	1	to	5
8	6		30		1		5
9	5		31		1		6
10	3		33		1		11
11	2		34		1		17
12 (or 2 sixes)	1		36		1		35

The table of the 36 chances shows the odds of being hit on any certain or flat die the following shows the odds of being hit on a six

2 Sixes	1	6 and 3 twice		2
2 Tros	1	6	2	2
2 Deuces	1	6		
6 and 5 twice	2	5	1	2
6 and 4 twice	2			

Which deducted from 36

Remainder is 19

That is 19 to 17 against hit upon a 6

The odds of 2 love are about 5 to 2

and of 2 to 1 is 2 1

and of 1 love is 3 2

If you play three up, your principal object in the first place, is, either to secure your own or your adversary's cinque point, when that is effected you may play a pushing game, and endeavour to gammon the adversary. The next best point (after you have gained your cinque-point) is to make your bar point, thereby preventing your adversary running with 2 sixes. After you have proceeded thus far, prefer making the quatre point in your own tables rather than the quatre point out of them. Having gained these points, you have a fair chance to gammon the adversary, if he be very forward for, suppose his tables are broken at home it will be then your interest to open your bar-point to oblige him to come out of your table with a six and having your men spread, you not only may catch that man which your adversary brings out of your tables, but will also have a probability of taking up the man left in your tables (upon supposition that he had two men there). And if he should have a blot at home, it will then be your interest not to make up your tables, because, if he should enter upon a blot, which you are to make for the purpose, you will have a probability of getting a third man, which, if accomplished will give you, at least, 4 to 1 of the gammon, whereas, if you have only two of his men up, the odds are that you do not gammon him. If you play for a hit only, one or two men taken up of your adversary's, makes it surer than a greater number, provided your tables are made up.

In bringing your men home in order to lose no point, you are to carry the most distant man to your adversary's bar-point, that being the first stage you are to place it on, the next stage is six points farther, viz in the place where your adversary's five men are first placed out of his tables, the next stage is upon the sixth point in your tables. This method is to be pursued till all your men are brought home except 2, when, by losing a point you may often save your gammon, by putting it in the power of 2 fives or 2 fours to save it. If you play to win a hit only, endeavour to gain either your own or your adversary's cinque point, if that fails by you being hit, and he is forwarder than you, then you must throw more men into his tables, thus put a man upon your cinque or bar point, and if your adversary neglects to hit it, you may then gain a forward instead of a back game, but if he hit you, you must play for a back-game, and then the greater number of men which are taken up, makes your game the better, because you by that means preserve your game at home and you must then always endeavour to gain both your adversary's ace and trois-points, or his ace and deuce-points, and take care to keep three men upon his ace-point, that if you chance to hit him from thence, that it may remain still secure to you. At the beginning of a set do not attempt a back game, as the risk is too great, since you run a chance of losing a gammon in order to win a single hit.

Directions for the Player to bear his Men.—1 If your adversary be greatly before you, never play a man from your quatre, trois, or deuce points, in order to bear that man from the point where you put it, because that nothing but high doublets can give you any chance for the hit therefore, instead of playing an ace or a deuce from any of the aforesaid points, always play them from your highest point, by which means, throwing two fives, or two fours, will, upon having eased your six and cinque points, be of great advantage whereas, had your six point remained loaded, you must, perhaps, be obliged to play at length those fives and four. 2 Whenever you have taken up two of your adversary's men and happen to have two, three, or more points made in your own tables, never fail to spread your men, either to take a new point in your tables or to hit the man your adversary may happen to enter. As soon as he enters one compare his game with yours and if you find your game equal, or better, take the man if you can, because it is twenty five to eleven against his hitting you, which being so much in your favour, you ought always to run that risk, when you have already two of his men up except you play for a single hit only, and playing that throw otherwise gives you a better chance for the hit, then do not take up that man. 3 Never be deterred from taking up any one man of your adversary by the apprehension of being hit with double dice, because the fairest probability is five to one against him.—4 If you should happen to have five points in your tables, and to have taken up one of your adversary's men, and are obliged to leave a blot out of your tables, rather leave it upon doublets than any other, because doublets are thirty-five to one against his hitting you and any other chance is but seventeen to one against him.—5 Two of your adversary's men in your tables are better for a hit than any greater number, provided your game is forwardest, because having three or more men in your tables gives him more chances to hit you, than if he had only two men.—6 If you are to leave a blot upon entering a man on your adversary's tables and have your choice where, always choose that point which is the most dis-

advantageous to him. To illustrate this, suppose it is his interest to hit or take you up so soon as you enter, in that case leave the blot upon his lowest point, that is to say, upon his deuce, rather than upon his trois, and so on, because all the men your adversary plays upon his trois or his deuce points are in a great measure out of play, those men not having it in their power to make his cinque-point, and consequently his game will be crowded there and open elsewhere, whereby you will be able also much to annoy him.—7 Prevent your adversary from bearing his men to the greatest advantage when you are running to save a gammon suppose you should have two men upon his ace point, and several others abroad, though you should lose one point or two in putting the men into your tables, yet it is your interest to leave a man upon the adver sary's ace-point, which will prevent him bearing his men to his greatest advantage, and will also give you the chance of his making a blot, that you may hit But if, upon a calculation, you find you have a throw, or a probability of saving your gammon, never wait for a blot, because the odds are greatly against hitting it

Cases showing how to calculate the Odds of saving or winning the Gammon —1 Suppose your tables made up, and that you have taken up one of your adversary's men, who has so many abroad as require three throws to put them in his table, it is then about an equal wager that you gammon him Because, in all probability, you will bear two men before you open your tables, and when you bear the third man, you will be obliged to open your six or cinque point, in that case it is likely that your adversary must take two throws before he enters his man in your tables and two throws more before he puts that man into his own tables and three throws more to put into his own tables the men which he has abroad, in all seven throws and as you have twelve men to bear, these probably will take seven throws in bearing, because you may twice be obliged to make an ace, or a deuce, before you can bear all No mention is here made of doublets of either side, that event being equal to each party The foregoing case shews it is in your power to calculate very nearly the odds of saving or winning a gammon upon most occasions

2 Suppose you have three men upon your adversary's ace point, and five points in your tables, and that the adversary has all his men in his tables, three upon each of his five highest points, what is the probability for a gammon?

Answer	*Points*
For his bearing three men from his 6 point, is	18
from his 5 point,	15
from his 4 point	12
from his 3 point,	9
from his 2 point,	6
Total	60
To bring your three men from the adversary's ace-point to the six-point in your tables, being for each 18 points, make in all	54
The remainder is	6

And as, besides the six points in your favour, there is a further consideration, that your adversary may make one or two blots in bearing, you have greatly the probability of saving your gammon This is supposed upon an equality of throwing

3 Suppose A leaves two blots, either of which cannot be hit but by two double dice to hit the one the cast must be eight, and for the other nine, by which means B has only one die to hit either of them with what are the odds of hitting either of these blots?

Ans The chances on two dice are in all 36

The chances to hit 8 are	6 and 2 twice	2
	5 and 3 twice	2
	2 deuces	1
	2 fours	1
The chances to hit 9 are	6 and 3 twice	2
	5 and 4 twice	2
	2 trois	1
	Total chances for hitting	11
	Remain chances for not hitting	25

So that it is 25 to 11 that B will not hit either blot

4 Suppose A leaves two other blots than the former, which cannot be hit but by double dice, the one by eight, and the other by seven What are the odds of B hitting either of these blots?

Ans The chances on two dice are in all 36

The chances to hit 8 are	6 and 2 twice	2
	5 and 3 twice	2
	2 fours	1
	2 deuces	1
The chances to hit 7 are	6 and 1 twice	2
	5 and 2 twice	2
	4 and 3 twice	2
	Total chances for hitting	12
	Remain chances for not hitting	24

Therefore it is two to one that A is not hit

Take the like method with three, four, or five blots upon double dice or with blots made upon double and single dice at the same time, then only find out (by the table of 36 chances) how many there are to hit any of those, and add all together in one sum, which subtract from the number 36, the whole of the chances upon two dice and so doing resolve any question required

Critical Cases for a Back game —1 Suppose A plays the fore game, and that all his men are placed in the usual manner For B's game suppose that 14 of his men are placed upon his adversary's ace point, and one upon his adversary's deuce point, and that B is to throw Which game is likeliest to win the hit?—*Ans* A's is the best by 21 *for*, to 20 *against* because if B misses an ace to take his adversary's deuce point, which is 25 to 11 against him, A is in that case to take up B's men in his tables, either singly, or to make points and if B secures either A's deuce or trois point, then A is to lay as many men down as possible, in order to be hit, that thereby he may get a back game When well versed in the game of back gammon, by practising this back game, you will become a greater proficient than by any other method, because it clearly demonstrates the whole power of the back game

2 Suppose A to have five men placed upon his six point, five men upon his quatre point, and five men upon his deuce-point and that B has three men placed upon A's ace-point, three men upon A's trois point, and three men upon A's cinque-point, let B also have three men upon his six-point, in his own tables, and three men placed out of his tables, in the usual manner Who has the better of the hit?—*Ans* It is an equal game, but to play it critically, the difficulty lies upon B, who should, in the first place, endeavour to gain the cinque and quatre-points in his own tables,

and when that is effected, he is to play two men from A's cinque-point, in order to oblige him to blot, by throwing an ace, which, if B hits, he will have the fairest probability of winning

3 Suppose A has three men upon B's ace-point, and three men upon B's deuce point, also three men upon his six-point in his own tables, and three men upon his usual point out of his tables, and three men where his five men are usually placed in his adversary's tables and suppose B has his men placed in the same manner, with this difference only, instead of having three men put upon A's deuce-point let B have three men upon A's trois point Who has the best of the hit?—*Ans* A, because the ace and trois points are not so good for a hit, as the ace and deuce points in B's tables, for when you are bearing the men, you have the deuce-point in your own tables to play them upon that often prevents you from making a blot, which must happen otherwise to the adversary, and take care to lay down men to be hit as often as you can, in order to keep your game backward, and for the same reason avoid hitting any blots which your adversary makes

4 *Cases of Curiosity and Instruction*—Suppose A has his fifteen men upon B's ace point, and that B has his bar-point, as well as his six, cinque, quatre, and trois points in his own tables How many throws is A likely to take to bring his fifteen men into his own tables, and to bear them? —*Ans* He may undertake to do it in 75 throws —It is odds in A's favour that he throws an ace in twice, and also that he throws a six in two more throws, when these events happen, A has a probability of not wanting above two or three throws before he has got all his fifteen men into his own tables, therefore by a former rule laid down to bring your men home, and also for bearing them, you may be able to find out the probability of the number of throws required. *Note*, B stands still, and does not play

5 Where A and B shall play fast as usual, and yet the hit may last for many hours

Suppose B to have borne thirteen men, and that A has taken up the two remaining men And also that A has fifteen men in B's tables, *viz* three men upon his six, three upon his cinque, three upon his quatre, three upon his trois, two upon his deuce, and one upon his ace-point Let A bring his fifteen men home, by always securing six close points till B has entered his two men, and brought them upon any certain point, as soon as B has done that, A must open an ace, deuce, or trois, or all three, which effected, B hits one of them, and A, taking care to have two or three men in B's tables, is ready to hit that man, and also he being assured of taking up the other man, has it in his power to prolong the hit to almost any length, provided he takes care not to open such points as two fours, two fives, or two sixes but always to open the ace, deuce, or trois points, for B to hit

6 What are the odds upon two dice, for throwing two sixes, two fives, or two fours, in thrice?

Ans Supposing 36 shillings to be the stake depending, the thrower will be entitled to have for his first throw *s* 3 *d* 0

That deducted, leaves 33, which divided again into 36 parts, make so many eleven pences, out of which the thrower is to have three for his second throw 2

The remainder, 30 shillings and three pence, is again to be divided into 36 parts, making so many ten pences, and the three pence divided into so many parts, make so many thirds of farthings, of which the thrower is to have three parts for his share for his third throw 2 6¼

Total for the thrower 8 3¼

So that it is 27*s* 8¾*d* to 8*s* 3¼*d*. against the thrower, which is very nearly as 10 to 3, that two sixes, two fives, or two fours, are not in three throws

7 *Back-game* Suppose A to have two men upon his own six point, three men upon his usual point out of his tables, two men upon the point where his five men are generally placed in his adversary's tables, five men upon his adversary's ace, and three upon his adversary's quatre-point, And B to have two men upon his own six point, likewise three upon his usual point out of his tables, two upon the point where his five are commonly placed in his adversary's tables, five upon his adversary's ace, and three men upon his adversary's trois-point Who has the fairest chance to win the hit?—*Ans* A has, because he is to play either an ace or a deuce, from his adversary's ace point, in order to make both those points as occasion offers, and having the quatre-point in his adversary's tables, he may more easily bring those men away, and will also have a resting place by the conveniency of that point, which at all times in the game will give him an opportunity of running for the hit, or staying, if he thinks proper Whereas B cannot so readily come from the trois point in his adversary's tables

8 Suppose A and B place their men in the following manner for a hit A has three men upon his own six point, three upon his usual point out of his tables and nine men upon his adversary's ace, deuce, and trois points, three being upon each, and suppose B's men to be placed in the same order and manner The result is, that the best player ought to win the hit, and the dice are to be thrown for, the situation being perfectly equal in A's and B's game If A throw first, let him endeavour to gain his adversary's cinque point, when that is effected, let him lay as many blots as possible, to tempt B to hit him, for every time that B hits them will be in A.'s favour, because it puts B backward, and let A take up none of B's men for the same reason A should always endeavour to have three men upon his adversary's ace and deuce points, because when B makes a blot, these points will remain secure, and by recourse had to a former case when A has borne five, six or more men, yet A may secure six close points out of his tables, in order to prevent B from getting his man home and by recourse had to the calculations he may easily find out (in case he makes up his tables) who has the better of the hit, and if he finds that B is the forwardest, he must then endeavour to lay such blots, as may give him a chance for taking up another man, in case B should happen to have a blot at home

Those who play the foregoing game well may be ranked in the first class

9 A has borne thirteen men, and has two men to bear upon his deuce-point; B has thirteen men in his own tables, with two men to enter B is to throw, and to name the throws both for

himself and A, but not to hit a blot of either side What throw is B. to name for both parties, in order to save his gammon?—*Ans* B calls for himself two aces, which enter his two men upon A's ace-point B also calls two aces for A, and consequently A cannot either bear a man, nor play one then B calls for two sixes for himself, and carries one man home upon the six point in his own tables, and the other he places upon his adversary's bar-point B also calls six-ace for A, so that A has one man left to bear, and then B calls for himself either two sixes, two fives, or two fours any of which bear a man, in case he has men in his tables upon those points

10 Suppose that both your own and your adversary's tables are made up Also that you have one man to carry home, but that he has two men on your bar point to carry home which lie in wait to catch your man and that if you pass him you are to win the hit suppose also that you have it in your choice to run the risk of being hit by 7 or by 8, both of which are chances upon double dice Which of these chances is it best for you to venture?—*Ans* That of 7, for the following reasons 1st Because that the chances of being hit by 7 or 8 are equal 2d If he does not hit 7, you will then have in your favour 23 chances to 13 that by your next throw you either hit or pass beyond him 3d In case your second throw should happen to be under 7, and that consequently you cannot hit him yet you may play that cast at home, and consequently leave the blot upon double dice Whereas, if, on the contrary, you had left the blot upon 8, you would have made a bad choice 1st Because the chances of being hit by 7 or by 8 are only equal 2d. Because if you should escape being hit by 8, yet you would then have but 17 chances in your favour, against 19, for either hitting or passing beyond him by your next throw 3d In case your second throw should happen to be six-ace, which is short of him, you would then be obliged to play the man that is out of your tables, not being able to play the six at home, and consequently to leave a blot to be hit by a single (or flat) die, which event, upon supposition that you play for 18 shillings a game, would entitle him to 11 shillings of the whole stake depending

The Laws of Back gammon—1 If you take a man or men from any point, that man or men must be played. 2 You are not understood to have played any man, till placed upon a point, and quitted 3 If you play with 14 men only, there is no penalty attending it, because with a lesser number you play to a disadvantage, by not having the additional man to make up your tables 4 If you bear any number of men before you have entered a man taken up, and which consequently you was obliged to enter, such men, so borne, must be entered again in your adversary's tables, as well as the man taken up 5 If you have mistaken your throw, and played it, and if your adversary has thrown, it is not in your or his choice to alter it, unless both parties agree

BACKHOUSE *s* (from *back* and *house*) The buildings behind the chief part of the house (*Car*)

BACKING, in the manage, a term used for the first time of mounting a colt (or taking seat upon the saddle) after he has been previously handled, quieted, stabled, and accustomed to the mouthing-bit, the cavezon, martingal, lunging-reign, saddle, and the whole of the apparatus with which he has been led his different paces in the ring all this he should be brought to submit to most quietly, as well as to the being saddled, and every other part of stable discipline, before any attempt is made to back him, if not, it cannot be termed a completion of the system

Opinion and practice have very much varied in respect to the age most proper for backing a colt, or even taking him in hand Not more than half a century past, colts were never touched (upon the score of handling) till rising four, backed and brought into gentle use when rising five, and never employed in constant work till nearly or quite six years old But from an unjustifiable precipitation, however, we now find colts handled at two, broke and racing at three, and in constant work at four in every part of the kingdom, in consequence of which, we also observe daily, horses at five, six, and seven years old, more impaired in their powers than they were formerly at double that age, and maimed with strained sinews swelled legs, splents, wind-galls, and other ailments

BACKING THE SAILS, in navigation, is arranging them in a situation that will force the ship to retreat, or move backwards this is only done in narrow channels, when a ship is carried along sideways by the tide or current, and wants to avoid any thing that may interrupt her progress, as shoals, vessels at anchor, &c or in the line of battle, when a ship wants to be immediately opposite to another with which she is engaged

BACK-PAINTING, a method of painting mezzotinto prints, pasted on glass, with oil-colours The art consists chiefly in laying the print upon a piece of crown glass, of a corresponding size In order to do this, the print must be well soaked in clean water, after which it must be laid between four sheets of paper, two over and two under it, that some of the moisture may be drawn out of it In the mean while, let the glass upon which the print is to be laid be warmed at the fire, then with a brush dipped in melted Strasburg turpentine, spread the turpentine smoothly and evenly on the glass Then lay the print upon the glass, rubbing it gently from one end to the other, that it may lie close Lastly, with the finger, rub off the paper from the back side of the print, till nothing can be seen but the print, like a thin film left upon the glass, and set it aside to dry When it is dry, varnish it over with some white transparent varnish, that the strokes and shades of the print may be seen through it, and it will then be fit for painting The colours necessary to be used are merely such oil colours as painters commonly employ

BACKPIECE *s* (from *back* and *piece*) The piece of armour which covers the back (*Cam*)

BACK-RAKING In farriery, an operation formerly used for removing indurated fæces in wind colics, by introducing the hand up the horse's rectum It has long been in disuse, however, among judicious practitioners, and very justly; and its place supplied by injections and purgatives

BA'CKROOM *s* A room behind (*Moxon*)

BA'CKSIDE *s* (from *back* and *side*) 1 The hinder part of any thing (*Newton*) 2 The hind part of an animal (*Addison*) 3 The yard or ground behind the house (*Mort*)

BACK-SINEWS OF A HORSE, the extensor tendons of the foot, placed behind the fore leg, and very frequently injured by overexertion The inflammation hereby produced is best removed in the first instance by emollient and astringent cataplasms If it be not removed speedily, ganglions succeed, for the general treatment and nature of which see GANGLIONS These, however, in horses are often removed in an early stage by firing

To BACKSLI'DE *v a* (from *back* and *slide*) To fall off, to apostatize (*Jeremiah*)

BACKSLI'DER *s* (from *backslide*) An apostate (*Proverbs*)

BACK-STAFF, an instrument formerly used for taking the sun's altitude at sea, being so called because the back of the observer is turned towards the sun when he makes the observation It was sometimes called Davis's quadrant, from its inventor, captain John Davis, a Welchman, and a celebrated navigator who produced it about the year 1590

This instrument consists of two concentric arches of box-wood, and three vanes the arch of the longer radius is of 30 degrees, and the other 60 degrees, making between them 90 degrees, or a quadrant also the vane at the centre is called the horizon-vane, that on the arch of 60° the shade-vane, and that on the other arch the sight vane It is unnecessary to give a more minute description, since more complete and accurate instruments have entirely superseded the use of this

BACKSTA'IRS *s* The private stairs in the house

BACK-STAYS, of a ship, are ropes belonging to the main-mast and fore-mast, and the masts belonging to them, serving to keep them from pitching forwards or overboard

BA'CKSWORD *s* (from *back* and *sword*) A sword with one sharp edge (*Arbuthnot*)

BA'CKWARD BACKWARDS *ad* (*back* and peaɲꝺ, Saxon) 1 With the back forward (*Genesis*) 2 Toward the back (*Bacon*) 3 On the back (*Dryden*) 4 From the present station to the place beyond the back (*Shakspeare*) 5 Regressively (*Newton*) 6 Toward something past (*South*) 7 Reflexively (*Davies*) 8 From a better to a worse state (*Dryden*) 9 Past, in time past (*Locke*) 10 Perversely, from the wrong end (*Shak*)

BA'CKWARD *a* 1 Unwilling, averse (*Atterbury*) 2 Hesitating (*Shakspeare*) 3 Sluggish, dilatory (*Watts*) 4 Dull, not quick or apprehensive (*South*) 5 Late, coming after something else

BA'CKWARD *s* The things or state behind or past (*Shakspeare*)

BA'CKWARDLY *ad* (from *backward*) 1 Unwillingly, aversely (*Sidney*) 2 Perversely (*Shakspeare*)

BACKWARDNESS, *s* (from *backward*) 1 Dulness, sluggishness (*Atterbury*) 2 Slowness of progression, tardiness

BACK-WORM, a name given by sportsmen to a disease very common to hawks, and called, also, the filander The usual seat of the worms is under the skin of the lower part of the back, towards the rump This disease is often cured by a scouring of washed aloes, mustard-seed, and agaric, of each equal quantities

BACON, the flesh of swine, salted, dried, and generally smoked in a chimney As the history and customs relative to this savoury dish would furnish but little instruction, we shall proceed to state one of the most approved methods of preparing it

Somersetshire bacon, the most esteemed in this country, may be made any time during the last three months of the year When a hog is killed for bacon, the sides are laid in large wooden troughs, and sprinkled all over with bay salt thus they are left for twenty-four hours, to drain away the blood and the superfluous juices After this first preparation, they should be taken out, wiped very dry, and the drainings thrown away Next some fresh bay salt, well heated in a large iron frying-pan, is to be rubbed over the meat, until it has absorbed a sufficient quantity, and this friction repeated four successive days, while the meat is turned only every other day If large hogs are killed, the flitches should be kept in brine for three weeks, and during that period, turned ten times, then taken out, and thoroughly dried in the usual manner, for, unless they be thus managed, it is impossible to preserve them in a sweet state, nor will their flavour be equal to those properly cured

As the preservation of the salt used in this process, when carried on to a great extent, may be an object of economy, we shall state the following method of recovering the saline matter contained in these drainings, or in any other brine, whether from herrings, beef, or pork it was communicated by a person who had seen it practised on the continent, where culinary salt is sold at a considerable price He first added such a quantity of boiling water to the brine, or drainings, as was sufficient to dissolve all the particles of the salt This solution he then placed in either an iron or earthen vessel, over a fire, which, by boiling, forced all the feculent and animal particles to the top, so that they were carefully removed by a perforated ladle After the liquid had become clear, it was set aside for twenty four hours, in a cool place, that the colouring matter might subside But, as the combination it had formed with the boiled liquor was very tenacious, he contrived two different ways of separating it 1 A solution of alum in water, one pint to an ounce of that substance, was gradually dropt into the cold liquor, in the proportion of a table-spoonful of the former to every gallon of the latter, and the whole allowed to stand for several hours, or, 2 If time and circumstances would permit, he filtered

the liquor by means of long flannel slips, cut longitudinally by the web, but previously soaked in another strong and perfectly clear solution of salt these slips were so immersed into the coloured fluid that the projecting external end reached another vessel, which had been placed much lower than that containing the brine, or drainings When these particulars were properly attended to, the absorbed liquor became almost colourless, and pellucid Having thus procured a clear liquid solution, nothing more was required than to evaporate it to dryness, in order to reproduce the salt in its original granulated form This process may be imitated without difficulty, and at very little expense Dr Willich, from whose Domestic Encyclopædia we now quote, says, the second method of discharging the colour is preferable, as by this no alum will be required, which only contaminates the salt

Bacon (service of the), a custom in the manor of Whichenacre, in Staffordshire, and priory of Dunmow, in Essex, in the former of which places, by an ancient grant of the lord, a flitch of bacon, with half a quarter of wheat, was to be given to every married couple who could swear, that, having been married a year and a day, they would never within that time have once exchanged their mate for any other person on earth, however richer, fairer, or the like But they were to bring two of their neighbours to swear with them that they believed they swore the truth On this the lord of another neighbouring manor, of Rudlow, was to find a horse saddled, and a sack to carry the bounty in, with drums and trumpets, as far as a day's journey out of the manor all the tenants of the manor being summoned to attend, and pay service to the bacon The bacon of Dunmow, first erected under Henry III, was on much the same footing, only the tenor of the oath was, that the parties had never once repented, or wished themselves unmarried again

Bacon (Roger), a Franciscan friar of great genius and learning, was born near Ilchester in Somersetshire, in the year 1214 He began his studies at Oxford, though in what school or college is uncertain In 1240, returning after a long residence at Paris, he assumed the Franciscan habit, and studied experimental philosophy with unremitting ardor and assiduity In 1278, through the envy and malice of his illiterate fraternity, who found no difficulty in possessing the vulgar with a notion of Bacon's dealing with the devil, he was restrained from reading lectures his writings were confined to his convent, and finally, he himself imprisoned in his cell, when 64 years old Nevertheless, during a confinement of 10 years, he went on in the rational pursuit of knowledge, corrected his former labours, and wrote several curious pieces He died in the year 1294, in the 80th year of his age, and was buried in the Franciscan church. His works are, 1 Epistola fratris Rogeri Baconis de secretis operibus artis et naturæ, et de nullitate magiæ Paris, 1542, 4to Basil, 1593, 8vo. 2 Opus majus Lond, 1733, fol published by Dr Jebb 3 Thesaurus chemicus Francf 1603, 1620 This bright luminary of the 13th century was a great linguist and grammarian, was well versed in the theory and practice of perspective, understood the use of convex and concave glasses, and the art of making them, knew the great error in the kalendar, assigned the cause, and proposed the remedy He was also an adept in chemistry, and was really the inventor of gunpowder, possessed great knowledge in the medical art, and was an able mathematician, logician, metaphysician, and theologist Indeed, friar Bacon is justly entitled to everlasting remembrance as a philosopher and truly great man If knowledge, says Dr Enfield, is now too far advanced for the world to derive much information from his writings, respect must nevertheless be paid to the memory of the man who knew more than his contemporaries, and who in a dark age added new lights to the lamp of science

Bacon (Francis), baron of Verulam, viscount of St Alban's, and lord high chancellor of England under king James I He was born in 1560, being son of sir Nicholas Bacon, lord keeper of the great seal in the reign of queen Elizabeth, by Anne daughter of sir Anthony Cook, eminent for her skill in the Latin and Greek languages He gave even in his infancy tokens of what he would one day become, and queen Elizabeth had many times occasion to admire his wit and talents, and used to call him her young lord keeper He was educated at Trinity college, Cambridge, a society which also enrols among its members the illustrious names of Newton and of Barrow While a very young student he discovered the futility of the peripatetic philosophy, which then prevailed in the schools At the age of 16 he went to France in the suite of sir Amias Pawlet, ambassador at that court While he was in this situation he wrote an acute piece, On the State of Europe, which displayed great observation and judgment, though he was then but 19 years of age On the death of his father he returned to England, and entered himself of Gray's-inn, where he applied to the study of law with such assiduity, that at the age of 28 he was appointed one of the queen's counsellors By this time he had made a great progress in the study of philosophy, and had sketched the plan of his Instauration of the Sciences, one of the greatest efforts of the human mind Unfortunately, by his attachment to the earl of Essex, who was at enmity with Cecil, Bacon lost those advantages at court which he had a right to expect His friend, however, feeling the value of his attachment, presented him nobly with an estate of land of considerable value It cannot be suppressed that Bacon came forward against this friend and benefactor on his trial In 1593 he was chosen member of parliament for Middlesex, and had the courage to oppose several measures of an arbitrary nature, for which he incurred the

queen's displeasure On the accession of James I his views began to brighten, and he obtained the honour of knighthood which was but the prelude to more considerable marks of distinction, in 1604 he was appointed one of the king's counsel, with a salary of 40*l* a year and a pension of 60*l* for life The next year he published the introduction to his great work, under the title of The Advancement and Proficiency of Learning, which procured him from the king the post of solicitor general About this time he bettered his fortune by marrying a daughter of Mr Barnham, a rich alderman of London In 1611 he was appointed judge of the marshalsea court, and about the same time obtained the place of register of the star chamber, the reversion of which had been granted him twenty years before In 1613 he was made attorney-general, and in 1616 he was sworn of the privy council at this time he contracted a close intimacy with the favourite George Villiers, to whom he wrote an admirable letter of advice, which is extant among his works In 1617 he was raised to the dignity of lord keeper of the great seal, and two years after he was constituted lord high chancellor of Great Britain, receiving also the patent of nobility by the title of baron of Verulam, which he exchanged the year following for that of viscount of St Alban's In 1620 he published the most elaborate of all his works, the Novum Organum Scientiarum, the design of which is to lay down a more perfect method of exercising the faculty of reason than had ever before been known This work he wrote 12 times over, making it a rule to revise and correct it once a year, till he brought it to the state in which he published it in 1620 The year following he was accused in parliament of bribery and corruption in his high office, these charges, it is to be lamented, were proved and admitted by the chancellor's confession, who was fined 40,000*l* and sentenced to be confined in the Tower during the king's pleasure, and rendered incapable of ever filling any office in the state in future He was soon restored to liberty, had his fine remitted, and was summoned to the first parliament of king Charles It must not be omitted that the greatest part of the blame attaches to his servants, and of this he was sensible for during his trial, as he passed through the room where his domestics were sitting, they all rose up at his entrance, on which he said, "Sit down, my masters, your rise hath been my fall After this disgrace he went into retirement, where he devoted himself to his beloved studies Notwithstanding his pension of 1800*l* a-year and his paternal estate, which was worth 700*l* a year, his liberality was so great that at his death, in 1626, his debts amounted to 22,000*l* His remains were interred in St Michael's church, at St Alban's, where his secretary sir Thomas Meautys erected a monument to his memory

It must for ever be deplored that the possessor of such an extraordinary intellect as lord Bacon should have been exposed to the dangers of a situation, to which his firmness was unequal; and, withdrawn from the retirement of his study, where he was among the first of men, should have been thrown into the tumult of business, where he discovered himself to be among the last

"If parts allure thee, think how Bacon shin'd,
The wisest, brightest, meanest of mankind"
Pope

The superiority, it is true, of his talents rendered him every where eminent and when we see him acting at court, in the senate, at the bar, or on the bench, we behold an engine of mighty force, sufficient, as to some it would appear, to move the world, but when we carry our research into his bosom we find little there besides the ebullition and froth of some corrupt passions, and we are struck with the contrast between the littleness within, and the exhibition of energy without Had Bacon contented himself with being a philosopher, without aspiring after the honours of a statesman and a courtier, he would have been a greater and a happier man

In his literary character Bacon must always be contemplated with astonishment we cannot sufficiently admire the riches or the powers of his mind, that penetration which no depth could elude, that comprehension for which no object was too large, that vigour which no labour could exhaust, that memory which no pressure of acquisitions could subdue We admire him as the inventor, at least in our country, of that useful as well as delightful vehicle of instruction, the Essay even here we see him displaying the comprehensive knowledge of Aristotle, with the graces and embellishments of Cicero But our admiration is greatly heightened, when we consider him as the great precursor of Newton, as the father of experimental philosophy By his two great works, On the Advancement of Learning, and The New Organ of the Sciences, written amid the distraction of business and of cares, sufficient of themselves to occupy the whole of almost any other mind, did this mighty genius first break the heavy shackles of that scholastic philosophy which had long impeded intellectual exertion, and, diverting the attention from words to things, from theory to experiment, he pointed out the road to that height of science, on which the moderns are now elevated

His writings are, indeed, an inestimable treasure an elegant edition of them was published in 1778, in 5 vols quarto A translation of his Novum Organum was published in 1802, in 2 vols foolscap 8vo

In consequence of the revolutions of science in the production of which Bacon was so illustrious an instrument, his philosophical works are in great measure extinct to the many, and now known scarcely otherwise than as a mighty name so that perhaps this most justly celebrated author may not improperly be considered as shrunk, like the ashes of an Alexander in a

golden urn, within the compass of that little but sterling volume his "Essays"

BACON, (John) a celebrated sculptor, descended from an ancient family in Somersetshire, was born in Southwark, Nov 24, 1740, where his father, Thomas Bacon, a clothworker, resided When very young, Mr Bacon discovered a great inclination for drawing, common to children, but not being particularly encouraged in it, he never made much proficiency in the art At the age of 14 he was bound apprentice to Mr Crispe of Bow Churchyard, where he was employed in painting on porcelain He occasionally assisted in the manufactory of china at Lambeth, particularly in forming small ornamental pieces, which he executed with so much taste as to indicate no ordinary powers To his honour be it mentioned, that by the encouragement he met with, he was able, principally, to support his aged parents, reduced in their circumstances, though by such an exertion he was obliged to abridge himself of the necessaries of life At the manufactory at Lambeth he had an opportunity of observing models of different sculptors, which were sent to a pottery on the same premises to be burnt From the sight of these he immediately conceived a strong inclination for his future profession Having once made his choice he was unremitting in his diligence, and it is said that his progress was as rapid as his turn was sudden and unpremeditated During this young man's apprenticeship he formed a design of making statues in artificial stone, and to his exertions is to be attributed the flourishing state of Coade's manufactory In 1763, Mr Bacon attempted to work in marble, and having never seen the operation performed he was led to invent an instrument for transferring the form of the model to the marble, this is called "getting out the points," which has been brought into use both in England and on the Continent The advantage of this instrument consists in its certainty and exactness, in its taking a correct measurement in every direction, in its occupying a small compass, and that it may be transferred either to the model or the marble, without a separate instrument for each In 1768, Mr Bacon removed to the west end of the town and attended upon the Royal Academy, where he received his first instructions, having never before seen the art of modelling or sculpture regularly performed. In the following year the gold medal for sculpture, the first ever given by the society, was voted to Mr Bacon He became an associate of that body in the year 1770, and from this time his reputation was firmly established, and he obtained patronage of the highest rank It would be needless to attempt an enumeration of the various works by which he attained to the first eminence in a very difficult profession The efforts of his genius are widely spread, and his name will long live the pride of the country which gave him birth, and from which he had never occasion to travel for the improvement of his talents, or the cultivation of a fine taste.

This distinguished artist was suddenly attacked with an inflammation in his bowels on the 4th of August, 1799, which terminated his life in little more than two days He died August 7th, in the 59th year of his age, leaving behind him a character as great for integrity and virtue as he had obtained in his profession as a sculptor (*British Encyclopædia, and Cecil's Memoirs of Bacon*)

BACOPA In botany, a genus of the class pentandria, and order monogynia Calyx five-parted, with unequal segments corol salver-shaped, stigma capitate, capsule one celled One species alone, a native of Guiana, stem herbaceous, fleshy, leaves opposite, lanceolate, sessile, peduncles axillary, solitary, one-flowered

BACTRIA, or BACTRIANA, in ancient geography, a country of Asia, which comprehended the present provinces of Balk and Gaur, and probably part of Korasan

BACTRIANUS, a species of the camel

BACTRIS In botany, a genus of the class and order monœcia, hexandria Male calyx three parted, corol one petalled, three cleft, stamens seated on the middle of the tube Fem calyx three-toothed, corol three-toothed, stigmas obscurely three-cleft, drupe coriaceous Two species, both of Carthagena and each full, tall, prickly trees with frondose leaves

BACTROPERATA, an ancient appellation given to philosophers by way of contempt denoting a man with a staff and a budget The word is also written *bactroperata* It is compounded of βακτρον, *staff*, and πηρα, *bag*, or *budget*

BACULARES, a sect of anabaptists, so called, as holding it unlawful to bear a sword, or any other arms, besides a staff

BACULARIUS, in writers of the middle age, an ecclesiastical apparitor, or verger, who carries a staff, *bacculus*, in his hand, as an ensign of his office

BACULE, in fortification, a kind of portcullis or gate, made like a pit-fall with a counterpoise, and supported by two great stakes

BACULOMETRY, the art of measuring accessible or inaccessible heights, by the help of one or more baculi, staves, or rods

BAD *a* (*quaad*, Dutch) 1 Ill, not good (*Pope*) 2 Vicious, corrupt (*Prior*) 3 Unfortunate, unhappy (*Dryden*) 4 Hurtful, unwholesome (*Addison*) 5 Sick

BAD, or BADE The preterit of *bid*

BADAJOS, or BADAJOZ, a town of Spain, and capital of Estramadura, situated on the Guadiana, on the frontiers of Portugal, and see of a bishop The fortifications are not very strong, yet it stood two sieges, one against the Portuguese in 1658, and another against the English and Dutch, supported by a considerable corps of Portuguese in 1705 eighty-two miles NNW Seville, forty-nine S Alcantara Lon 11 58 E Ferro Lat 38 43 N

BADCOCK (Samuel), an English divine, was born at South Molton, in Devonshire, Feb 23, 1747 He was educated for the ministry among the dissenters, under a Mr Rook-

er, at St Mary Ottery He was ordained pastor of a congregation at Wimbourne, in Dorsetshire, from whence he removed to Barnstaple, in Devon, in 1769 here he mingled much with men of talents, and of different sentiments, which at length produced a change in his theological opinions this change of views was not accompanied with a similar one in the minds of his congregation he therefore quitted the charge and returned to his native place, where he officiated to the dissenters till 1787, and soon after was admitted into the church of England by the bishop of Exeter After serving a church in Devonshire for a little time, he went to Bath, and became assistant to Dr Gabriel at the octagon chapel

In 1781, he distinguished himself as the reviewer and opponent of the late Mr Martin Madan's weak but popular Thelyphthora In this controversy Mr Badcock evinced a remarkable force of genius, skill of argument, and display of learning and justly engaged the attention and admiration of the public upon his criticisms In the same year he also wrote a poem entitled, The Hermitage

On the publication of Dr Priestley's History of the Corruptions of Christianity, Mr Badcock undertook the refutation of that part which was the most laboured and important of the whole work, viz The History of Opinions relative to Jesus Christ This he accordingly did in the Monthly Review for 1783 His critique was long, but smart, and shewed an uncommon extent of reading in the ancient fathers, ecclesiastical history, and the Socinian writers Dr Priestley felt this attack so severely, and especially as it was made from a quarter so unexpected as the Monthly Review, that with his usual celerity, in less than a month, he published A Reply to the Animadversions though the remainder of the critique upon his work had not yet appeared When he published this Reply he did not know who his antagonist was, and therefore, unbiassed by prejudice, and untouched with resentment, he bestowed this eulogium on him "The knowledge and ability of the present reviewer makes him a much more formidable, and therefore a more respectable antagonist

In the Review, for September, 1783, Mr Badcock gave a complete examination, and, as hath been generally thought, a complete refutation, both of the doctor's history, and the above-mentioned defence of it This critique is, indeed, a masterly performance, and searches all the doctor's arguments for his favourite cause to the very bottom

When Dr White was appointed Bampton lecturer in Easter term, 1783, in order to complete the lectures on the plan he had formed, he found it expedient to avail himself of the best aid he could procure This made him turn his attention to Mr Badcock, and about November following he paid him a visit at South Molton, for the purpose of soliciting his assistance in the formation of a work that should be worthy the attention of the public Mr Badcock undertook his part with alacrity, executed it speedily, and in a manner that will immortalise his name The parts allotted to, and written by Mr Badcock, are, the greatest share of Lecture the First, the best part of Lecture the Third, about a fourth of Lecture the Fifth, almost the whole of Lecture the Seventh, and a small part of Lecture the Eighth Of the notes appended to the lectures, Mr Badcock is acknowledged to have furnished about one-fourth

At the Lent assize, 1788, he preached in the cathedral of Exeter, before the judges, a sermon which was much admired by those who heard it May the 19th following he died of a bilious complaint, at the house of his affectionate and worthy friend, sir John Chichester, baronet, in Queen street, Mayfair

BADE, or BADEN, a margraviate and sovereignty of Germany, in the circle of Swabia It is divided into two principalities, that of Baden Baden, and Baden-Durlach Baden-Baden is bounded on the west by the Rhine, though a small part lies on the west side of that river, on the north by Baden Durlach, on the east by the duchy of Wurtemberg, and on the south by the Brisgaw The principal towns are Rastadt, Baden, Ettingen, Steinbach, and Stolhofen The margrave of Baden-Baden is a sovereign prince, and has a vote in the college of princes The established religion is Roman Catholic Baden Durlach is bounded on the north by the palatinate and the bishopric of Spire, on the east by the duchy of Wurtemberg, on the south by Baden-Baden, and on the west by the Rhine The principal towns are Durlach, Pforzheim, Muhlburg, and Emmendingen This prince enjoys two votes in the college of princes of the empire, viz one for Baden-Durlach, the other for Hochberg The reigning prince and his subjects profess Lutheranism

BADEN, a town of Germany, in the circle of Swabia and capital of the marquisate of Baden-Baden, celebrated for its hot baths, whence its name Twenty two miles NE Strasburgh thirty-six W Stuttgard, and forty SSW Heidelberg Lon 25 53 E Ferro Lat 48 46 N

BADEN, a county and bailiwick of Swisserland, in Argow, formerly an independent county, but now subject to the cantons, lying on both sides the Limmat, bounded on the west by the river Aar, on the north by the Rhine, and on the south by the Reusz, about seven leagues long, and three wide The soil is fertile, and in general abounds in grain and fruit The mountains yield excellent freestone, marble, and iron ore The greater part of the inhabitants are Roman Catholics the principal town is Baden

BADEN, or UPPER BADEN, a town of Swisserland, and capital of the county so called, situated on the Limmat It is the residence of the bailiff, who is appointed by the cantons of Zurich, Berne, and Glaris, alternately; the two former appoint for seven years, but Glaris only for two Divers monuments testify the antiquity of this town, and the virtue of its

mineral waters have been long known. The dukes of Austria had formerly a castle here, where they resided when they visited their estates in Helvetia, till it was taken, with the whole country, from duke Frederick, in the year 1415 The baths are constructed on both sides of the Limmat, and form a separate town half a mile below the other The waters are warm and abundant, supplying two large public reservoirs for the use of the poor, besides two hundred private baths twenty-seven miles SE Bâle, fourteen NW Zurich Lon 25 53 E. Ferro Lat 47 28 N

BADGE *s*, (*bajulo, to carry*, Lat) 1 A mark or cognizance worn (*Atterbury*) 2 A token by which one is known (*Fairfax*) 3 The mark of any thing (*Dryden*)

To BADGE *v a* To mark (*Shakspeare*)

BA'DGER *s* (*bajulo, to carry*, Lat) One that buys corn and victuals in one place, and carries it to another (*Cowell*)

BADGER, in zoology See URSUS

BADGER-BAITING BADGER-HUNTING The badger has suffered more perhaps from vulgar prejudices than any other animal He has been accused of destroying lambs and rabbits the first unquestionably without foundation, and it is uncertain whether the last charge be better supported, for many naturalists maintain that his sole food consists in roots, fruits, grass, insects, and frogs From this general and double accusation, however, the harmless badger has been selected to make sport, as it is called, for the vulgar, in both hunting and baiting

Hunting the badger is in general only performed by moonlight, the badger, from his natural habits, being never to be found above ground by day In this sport the hunters are obliged to oppose art to cunning, and obtain by stratagem what they cannot effect by strength At a late hour in the evening, when the badger is naturally concluded to have left his kennel or his castle in search of food, some of the party (as previously adjusted) proceed to place a sack *at length* within the burrow, so constructed that the mouth of the sack directly corresponds with the mouth of the earth, and is secured in that position by means of a willow hoop, which, from its pliability, readily submits to the form required This part of the business being completed, the parties withdrawn, and the signal whistle given, their distant companions lay on the dogs, (either hounds, terriers, lurchers, or spaniels), encouraging them through the neighbouring woods, coppices, and hedge-rows, which the badgers abroad no sooner find, than being alarmed, and well knowing their inability to continue a state of warfare so much out of their own element, instantly make to the earth for shelter, where, for want of an alternative, and oppressed with fear, they rush into certain destruction by entering the sack, being entangled in which, soon secured by those who are fixed spot for that purpose If the badger the ill-construction or accidental fall- sack, and safely enter the earth, digging him out is not only a very laborious but very precarious attempt, for the badger, from instinctive ingenuity, will be generally found to have formed his retreat before he can be reached, to render which the more easy, he usually constructs his kennel among the roots of some old pollard, in the banks of moors, or underneath some hollow tree from the spreading root branches of which the burrows run in such various and perplexing directions, that his assailants are often compelled, after tiring themselves by digging fifteen or twenty feet, to relinquish the pursuit, corroborating the opinion of the common people, that in a loose and sandy soil badgers can make a way as fast as their hunters can pursue them whence drawn battles in such situations are very common results

Badger-baiting is a different sport, and if possible of a still lower description It consists in attacking the animal at a distance from his burrow, with dogs of almost any kind, but most successfully with the terrier The badger is so rapid in his motions, that the dogs are often desperately wounded, and compelled to give up the contest The looseness and thickness of the badger's skin are admirably contrived for his advantage, in consequence of the latter, and especially in conjunction with the coarseness and toughness of his hair, it is difficult for the dogs to lay hold of him, and in consequence of the former, he finds great facility of escaping from their grasp when they have succeeded

BADIAN SEMEN See ANISUM STELLATUM

BADIGEON, a mixture of plaster and free-stone, well ground together, and sifted, used by statuaries to fill up the little holes, and repair the defects in stones, whereof they make their statues and other work

The same term is also used by joiners for saw-dust mixed with strong glue, wherewith they fill up the chaps, and other defects in wood, after it is wrought

BA'DLY *ad* (from *bad*) Not well (*Shak*)

BADNESS *s* Want of good qualities (*Addison*)

BÆA, in botany, a genus of the class diandria, order monogynia Corol ringent, with a very short tube, the upper lip three-toothed, lower flat, two lobed, capsule two-celled, four-valved, twisted, calyx five-parted, equal One species only, a native of the straits of Magellan, a stemless plant, with blue flowers

BÆCKEA, in botany, a genus of the class octandria, genus monogynia Calyx funnel-form, five-cleft, corol five-petalled, capsule three or four-celled, many seeded, covered with the calyx Two species only

1 B frutescens a Chinese shrub

2 B densifolia a native of New Holland

BÆOBOTRYS, in botany, a genus of the class pentandria, order monogynia Corol tubular, five cleft, calyx double superior; the outer two-leaved, inner campanulate, five-toothed, berry one-celled, many-seeded. Two species

1 B nemoralis a native of the Tanna island

2 B lanceolata Arabia Fælix

BÆTICA, a province of ancient Spain, so called from the famed river Bætis, afterwards Tartessus, now Guadalquiver, or the great river It was bounded on the west by Lusitania, on the south, by the Mediterranean and Sinus Gaditanus, on the north, by the Cantabric sea, now the Bay of Biscay On the east and north east its limits cannot be so well ascertained, as they are very reasonably thought to have been in a continual state of fluctuation, as each petty monarch had an opportunity of encroaching upon his neighbour The province was divided in two by the river Bætis already mentioned The whole province of Bætica contained, according to the most probable account, what is now called Andalusia, part of the kingdom of Grenada, and the outward boundaries of Estremadura

BÆTYLIA, anointed stones worshipped by the Phœnicians, by the Greeks before the time of Cecrops, and by other barbarous nations They were commonly of a black colour, and consecrated to some god, as Saturn, Jupiter, the Sun, &c Some are of opinion that the true origin of these idols is to be derived from the pillar of stone which Jacob erected at Bethel, and which was afterwards worshipped by the Jews These *lætylia* were much the object of the veneration of the ancient heathens Many of their idols were no other

BAFFETAS, or BASTAS, a cloth made of coarse white cotton thread, which comes from the East Indies Those of Surat are the best

BAFFIN S BAY, the name given to a gulph in North America, running from 70 to 79 N lat pretended to be discovered by one *Baffin*, in 1616 This bay has obtained a place on most, if not all, modern maps and globes, though there is great reason to doubt whether it has any real existence

To BA'FFLE *v a* (*beffler*, French) 1 To elude, to make ineffectual (*South*) 2 To confound, to defeat with some confusion (*Addison*)

BAFFLE *s* (from the verb) A defeat (*So*)

BA'FFLER *s* (from *baffle*) He that puts to confusion, or defeats (*Gov of the Tongue*)

BA'FFO, a considerable town in the island of Cyprus Lat 34 50 N Lon 32 30 E Near this was the ancient Paphos

BAG *s* (belʒe, Saxon) 1 A sack, or pouch (*South*) 2 That part of animals, in which some particular juices are contained (*Dryden*) 3 An ornamental purse of silk tied to men s hair (*Addison*)

BAG, in commerce, a term signifying a certain quantity of some particular commodity a bag of almonds, for instance, is about 300 lb weight, of aniseeds, from 300 to 400, of hops, about 2½ cwt &c Bags are also used in most countries to put several sorts of coin in, either of gold, silver, brass, or copper

BAG, in botany See FOLLICLE

BAG, among farriers, a name given to a medicine formerly much esteemed for restoring a lost appetite It consists of an ounce of assafœtida, and an equal quantity of powdered savine, put into a small bag, which they fasten to the horse s bit, and keep him bridled for the space of two or three hours, twice or three times a day

To BAG *v a* (from the noun) 1 To put into a bag (*Dryden*) 2 To load with a bag (*Dryden*)

To BAG *v n* To swell like a full bag (*Dryden*)

BAGATE'LLE *s* (*bagatelle*, Fr) A trifle not English (*Prior*)

BAGAUDÆ, or BACAUDÆ, an ancient faction of peasants, or malecontents, who ravaged Gaul The Gauls being oppressed with taxes, rose about the year of Christ 290, under the command of Amand and Elian, and assumed the name *bagaudæ*, which, according to some authors, signified in the Gallic language *forced rebels*, according to others, *tribute*, according to others, *robbers*

BAGDAD, a town of Asia, in the Arabian Irak, on the east side of the Tigris It is computed to be about one thousand five hundred paces in length, seven or eight hundred in breadth, and three thousand in circumference Its walls are of brick, with terraces, and large towers at proper distances, in form of bastions, and defended by about sixty pieces of cannon The castle is large, and flanked by some small towers with cannon, and the garrison usually consists of nine hundred foot, four thousand horse, and sixty gunners The inhabitants are thought to be about fifteen thousand, including those who live in a suburb, on the other side of the Tigris, at the end of the bridge of boats, which is undone every night to prevent a surprise Bagdad was built out of the ruins of the Old Seleucia, by Mohammed II caliph of the Saracens, who, in 762, made it the capital of his kingdom Lat 33 20 N Lon 44 26 E

BAGGAGE, in military affairs, denotes the clothes, tents, utensils of divers sorts, provisions, and other necessaries, belonging to an army Before a march, the waggons with the baggage are marshalled according to the rank which the several regiments bear in the army, being sometimes ordered to follow the respective columns of the army, sometimes to follow the artillery, and sometimes to form a column by themselves The general s baggage marches first, and each waggon has a flag, showing the regiment to which it belongs

Packing up the baggage (*vasa colligere*), was a term among the Romans, for preparing to go to war, or to be ready for an expedition. They distinguished two sorts of baggage, a *greater* and *less* The less was carried by the soldier on his back, and called *sarcina*, consisting of the things most necessary to life, and which he could not do without Hence *colligere sarcinas*, packing up the baggage, is used for decamping, *castra movere* The greater and heavier was carried on horses and vehicles, and called *onera* Hence *onera vehiculorum, sar-*

ence hominum The baggage-horses were denominated *sagmentarii equi*

BAGGAGE, a worthless woman

BAGGING OF HOPS See HOPS

BAGNAGAR, the capital of the kingdom of Golconda, a province belonging to the Great Mogul Here are abundance of European jewellers, as also Jews, Armenians, and Greeks, the most expert cutters of diamonds, and best judges of their worth Lat 15 30 N Lon 78 30 E

BAGNERES, a town of France, in the department of the Upper Pyrenées, and late province of Bigorre Lat 43 3 N Lon 0 12 E

BAGNIO, an Italian word, signifying a bath we use it for a house with conveniences for bathing, cupping, sweating, and otherwise cleansing the body, and too frequently for worse purposes

BAGNOLIANS, or BAGNOLANSES, in church-history, a sect of heretics, who in reality were Manichees, though they somewhat disguised their errors They rejected the Old Testament and part of the New, held the world to be eternal, and affirmed that God did not create the soul when he infused it into the body

BAGPIPE, a musical instrument of the wind-kind, chiefly used in country places, especially in the north It consists of two principal parts, the first a leathern bag which is blown up like a football, by means of a port-vent, or little tube, fitted to it and stopped by a valve The other part consists of three pipes, or flutes, the first called the great pipe, or drone, and the second the little one, which pass the wind only out at the bottom the third has a reed, and is played on by compressing the bag under the arm, when full, and opening or stopping the holes, which are eight, with the fingers The little pipe is ordinarily a foot long, that played on thirteen inches, and the port-vent six The bagpipe takes in the compass of three octaves

BAGUETTE, in architecture, a small round moulding, less than an astragal

BAGUETTE DEVINATOIRE, the divining rod, a piece of philosophical quackery The divining rod is nothing else than a forked piece of hazle, the two branches of which are often from fifteen to eighteen inches in length, and form an angle of thirty or forty degrees The two branches are held in the hands in a certain manner, so that the trunk or middle is turned towards the heavens Some persons, it is said, are endowed with such a property, that if they hold this rod as above described, it tends by a violent effort to turn its trunk downwards, when in the proximity of a spring, or of precious metals concealed in the bowels of the earth, or stolen money, &c Nay, some have even asserted, that it has pointed out, in this manner, the traces of criminals, robbers, or assassins. (See Hutton's Translation of Montucla's Ozanam, vol iv p 260) A lady of rank (but whose name we are not at liberty to mention in public) wrote several letters to Dr Hutton on the subject of the divining rod, describing the way in which *she* discovered that she possessed the faculty of finding water by such an instrument, and relating that she actually found water by means of the hazle, in the duke of Manchester's park, at Kimbolton, Huntingdonshire, about thirty years ago The same lady also exhibited successfully her method of discovering water, about two years ago at Woolwich Common Still we must be permitted to think the whole a delusion, and we believe, that in the case now adverted to the lady, though of an acute and accomplished mind, has in some way or other deluded herself

BAHAMA ISLANDS called also the LUCAYA ISLANDS the easternmost of the Caribbees in the Atlantic Ocean They are very numerous

BAHAR, a country of Hindoostan Proper, bounded on the W by Allahabad and Oude, on the N by Napaul, on the E by Bengal, and on the S by Orissa It is subject to the English East India Company, and most of the saltpetre they export is manufactured in this province of which Patna is the capital

BAHAR, or BARR a weight used in Fernate, Mocha, in the Moluccas, Achem, and divers other parts of the East-Indies The great bahar is 481 pounds 4 ounces, and the little 401 pounds 7 ounces, Paris measure

BAHAREN ISLAND, an island in the Gulph of Persia, formerly famous for its pearl fishery, which is now almost ruined Lat 26 10 N Lon 49 5 E

BAHUS, a fortified town of Sweden Lat 57 52 N Lon 11 42 E

BAIÆ, now BAJAH, a city of Campania, near the sea, founded by Baius, one of the companions of Ulysses It is famous for its delightful situation and baths, where many of the Roman senators had country houses (*Martial, Horat &c*)

BAIAH, a town of Naples, in Italy, famous for its hot baths and elegant palaces in the time of the Romans of which some ruins still remain Lat 40 51 N Lon 14 5 E

BAIDARS, the name of a kind of small canoes, used among the natives of the Kurilly islands, and of the north western coast of America

BAIKAL, a lake of Siberia, on the road from Muscovy to China It is of large extent, and its waters are fresh and clear There are a great many seals in it of a blackish colour, with multitudes of fish, particularly sturgeons of a prodigious size Lat 51 20 to 55 20 N Lon 104 to 110 E

BAIL, in law, the setting at liberty one arrested, or imprisoned upon an action either civil or criminal, under sureties taken for his appearance at a day and place assigned It is called *bail*, because hereby the party confined is *baillé*, from the Greek βαλλειν, delivered into the hands of those who bind themselves for his forthcoming, or from *bail*, used in the sense of a guardian, into whose hands the party is put for security sake Manwood distinguishes between *bail* and *mainprise* thus he that is

mainprised is said to be at large, and to go about at his liberty, without ward, till the time of appearance, whereas he who is let to *bail* to two or more men, is always accounted by law to be in their ward and custody for the time, and they may, if they please, actually keep him in prison In civil cases every defendant is *bailable*, but in criminal matters it s otherwise By the ancient common law, before and since the Conquest, all felonies were *bailable*, till murder was excepted by statute But the stat Westm 1 3 Edw I 15 takes away the power of *bailing* in treason, and divers instances of felony And the statute 1 and 2 Ph and Mar c 13 farther regulates this matter so that now no justices of the peace can bail upon an accusation of treason, of murder, or of manslaughter, if the prisoner be clearly the slayer, or an indictment be found against him, nor of felony, against those who have broken prison Outlawed persons, and those who have abjured the realm approvers, and persons accused by them persons taken with the *mainour*, or in the fact of felony, persons charged with *arson*, and excommunicated persons, are also inadmissible to bail But it is agreed that the court of King s Bench (or any judge thereof, in time of vacation) may bail for any crime whatever And herein the wisdom of the law is manifest To allow bail to be taken commonly for enormous crimes would greatly tend to elude the public justice, and yet there are cases, though they rarely happen in which it would be hard and unjust to confine a man in prison, though accused even of the greatest offence The law has therefore provided one court, and only one, which has a discretionary power of bailing in any case except only even to this high jurisdiction, and of course to all inferior ones, such persons as are committed by either house of parliament, so long as the session lasts, or such as are committed for contempts by any of the king s superior courts of justice

Clerk of the Bails, is an officer belonging to the court of the King s bench he files the bail-pieces taken in that court, and attends for that purpose

Bail, or Bale, in the sea-language The seamen call throwing the water by hand out of the ship or boat s hold, *bailing* They also call those hoops that bear up the tilt of a boat, its *bails*

To Bail *v a* (from the noun) 1 To give bail for another (*Shakspeare*) 2 To admit to bail (*Clarendon*)

BA'ILABLE *a* (from *bail*) That may be set at liberty by bail or sureties

BAILIE, in Scots law, a judge anciently appointed by the king over such lands not erected into a regality as happened to fall to the crown by forfeiture or otherwise, now abolished It is also the name of a magistrate in royal boroughs, and of the judge appointed by a baron over lands erected into a barony

BAILIFF, (*ballivus*, from the French word *bailiff*), that is, *præfectus provinciæ*, and as the name, so the office itself was answerable to that formerly in France, which had eight parliaments, that were high courts from whence there lay no appeal, and within the precincts of the several parts of that kingdom which belonged to each parliament, there were several provinces in which justice was administered by certain officers called *bailiffs*, and in England there are several counties in which justice hath been administered to the inhabitants by the officer who is now called *sheriff* or *viscount* (one of which names descends from the Saxons, the other from the Normans), and though the sheriff is not called *bailiff*, yet it is probable that was one of his names also, because the county is often called *ballива* And in the statute of Magna Charta, c 28 and 14 Ed III c 9 the word *bailiff* seems to comprise as well sheriffs as bailiffs of hundreds As the realm is divided into counties, so every county is divided into hundreds, within which in ancient times the people had justice ministered to them by the officers of every hundred. But now the hundred courts, except certain franchises, are swallowed in the county courts, and the bailiff s name and office are grown into contempt, they being generally officers to serve writs, &c within their liberties Though, in other respects, the name is still in good esteem for the chief magistrates in divers towns are called *bailiffs* or *bailies*, and sometimes the persons to whom the king s castles are committed are termed *bailiffs*, as the *bailiff of Dover Castle*, &c

Bailiff also signifies an under steward of a manor

Water-bailiff, an officer appointed in all port towns for the searching of ships, gathering the toll for anchorage, &c and arresting persons for debt, &c on the water

BAILIWICK, that liberty which is exempted from the sheriff of the county, over which liberty the lord thereof appoints his own bailiff, with the like power within his precinct as an under-sheriff exercises under the sheriff of the county or, it signifies the precinct of a bailiff, or the place within which his jurisdiction is terminated

BAILLY (John Sylvain), a celebrated French philosopher, was born at Paris in September, 1736 He early showed a strong inclination to scientific pursuits, which was encouraged by his friends When young, he communicated some valuable papers to the Royal Academy of Sciences, and, in 1773, addressed a letter to Bernoulli, on some discoveries respecting the satellites of Jupiter, which was inserted in the Journal Encyclopedique In 1768 he published the eloge of Leibnitz, for which he was rewarded with the gold medal by the academy of Berlin This was followed by the eloges of Charles V, La Caille, and Corneille, which, with the former, were collected together In 1775 appeared the first volume of his great and excellent work, 'The History of Astronomy, the third and last volume of which was published in 1779 Besides these performances, this great man presented the learned world with a great number of va-

luable historical disquisitions and astronomical observations He was elected into the French academy in 1763 How is it to be lamented that such a mind as that of Bailly should be hurried into the gulph of revolutionary politics! He entered eagerly into the concerns of his native country, and was president of the first national assembly, at the time when the king issued a proclamation for them to disperse On the ever memorable 14th of July, 1789, he was chosen mayor of Paris, but he held his popularity a very little while, owing to the liberal sentiments which he expressed for the royal family, and his enforcing obedience to the standing laws ' In consequence of this he resigned his office in 1791, and went into that philosophical retirement, from whence it would have been prudent for him not to have issued at first When the reign of terror and blood naturally came on, Bailly was selected as one of its victims, and suffered under the detestable guillotine, Nov 12th, 1793, aged 57 years For an account of his different works and papers in the Mem Acad, see the Eloge de Bailly, by Lalande, or Hutton's Dict art Bailly See also Bailly's posthumous work, entitled *Memoires d'un Temoin de la Revolution*, or Edinburgh Review, vol vi p 137, &c

BAILMENT, in law, is a delivery of goods in trust, upon a contract, expressed or implied, that the trust shall be faithfully executed on the part of the baillee As if cloth be delivered, or (in our legal dialect) bailed, to a taylor to make a suit of clothes, he has it upon an implied contract to render it again when made, and that in a workmanly manner If money or goods be delivered to a common carrier to convey from Oxford to London, or from London to Edinburgh, &c he is under a contract in law to pay, or carry them to the person appointed If a horse or other goods be delivered to an innkeeper or his servants, he is bound to keep them safely, and restore them when his guest leaves the house If a man takes in a horse, or other cattle, to graze and depasture in his grounds, which the law calls *agistment*, he takes them upon an implied contract to return them on demand to the owner

BAINBRIDGE (Dr John), an eminent physician and astronomer, born at Ashby-de-la-Zouch, in Leicestershire, in 1582 He taught a grammar-school for some years, and practised physic, employing his leisure hours in astronomy, which was his favourite study at length he removed to London, was admitted a fellow of the College of Physicians, and raised his character by his description of the comet in 1618 The next year sir Henry Savile appointed him his first professor of astronomy at Oxford, and the masters and fellows of Merton college made him first junior, and then superior, reader of Linacre's lecture He died in 1643, having written many works, some of which have never been published but the MSS are preserved in the library of [illegible], Dublin

[illegible]NGA, or Bain River, a large river of Hindoostan, which rises near the S bank of the Nerbudda, runs southward through the heart of Berar, and, after a course of near four hundred miles, unites with the Godavery, within the hills that bound the British Northern Circars

BAIRAM, or Beiram, a Turkish word which signifies a solemn feast The Mahometans have two bairams, the *great* and the *little* The *little* bairam is properly that held at the close of the fast Ramazan, beginning with the first full moon in the following month, Shawal The *great* bairam is properly that held by the pilgrims at Mecca, commencing on the 10th of Dhu Ihajia, (when the victims are slain), and continuing three days On the feast of bairam, after throwing little stones, one after another, into the valley of Mina, they usually kill one or more sheep, some a goat, bullock, or even a camel, and after giving a part thereof to the poor, eat the rest with their friends After this, they shave themselves The second is a day of rest, and on the third they set out on their return home

To BAIT *v a* (batan, Saxon) 1 To put meat to tempt animals (*Ray*) 2 To give meat to one's self, or horses, on the road (*Spenser*)

To Bait *v a* (from *battre*, Fr) 1 To attack with violence (*Shaks*) 2 To harass by the help of others

To Bait *v n* To stop at any place for refreshment (*Milton*)

To Bait *v n* (*as a hawk*) To clap the wings, to flutter (*Shaks*)

Bait *s* (from the verb) (See Angling)
1 Meat set to allure animals to a snare (*Sh*),
2 A temptation, an enticement (*Addison*),
3 A refreshment on a journey

BAIT-EL LAHAM, the ancient *Bethlehem*, in geography, a village about two leagues SE of Jerusalem

BAITING, the act of smaller or weaker beasts attacking and harassing greater and stronger In this sense we hear of the baiting of bulls or bears by mastiffs or bull-dogs with short noses, that they may take the better hold The plea of utility is made in justification of *bull-baiting*, as a bull is rarely killed without being first baited But the flesh, though tenderer and more digestible, is in reality more disposed to putrefaction, and perhaps on this account is scarcely so wholesome But it is in fact a spirit of barbarism that keeps up the sport bulls are kept on purpose, and exhibited as standing spectacles for the public entertainment The poor beasts have not fair play they are not only tied down to a stake, with a collar about their necks, and a short rope, which allows them only about four or five yards play, but they are disarmed too, and the tips of their horns cut off, or covered with leather, to prevent their hurting the dogs In this sport, the chief aim of the dog is to catch the bull by the nose, and hold him down to which end he will even creep on his belly The bull's aim, on the contrary, is with equal industry to defend his nose in order to which, he thrusts it close to the ground, where his

horns are also in readiness to toss the dog. Bull baiting was first introduced into England as an amusement in the reign of king John, about the year 1209.

BAJULUS, an ancient officer in the court of the Greek emperors. There were several degrees of bajuli: as, the grand *bajulus*, who was preceptor to the emperor, and the simple *bajuli*, who were sub-preceptors. The word is derived from the Latin verb *bajulare*, "to carry or bear a thing on the arms or on the shoulders."

AJULUS, in entomology, a species of cerambyx, found in the trunks of trees in the northern parts of Europe. See CERAMBYX.

BAIZE. *s.* A kind of coarse open cloth.

To BAKE. *v. a.* (bacan, Saxon.) 1. To heat any thing in a close place (*Isaiah*). 2. To harden in the fire (*Bacon*). 3. To harden with heat (*Dryden*).

To BAKE. *v. n.* 1. To do the work of baking (*Shaks.*). 2. To be heated or baked (*Shaks.*).

BA'KEHOUSE. *s.* A place for baking bread.

BA'KER. *s.* (from *to bake*.) He whose trade is to bake (*South*).

BAKER (Thomas), a learned mathematician, was born at Ilton, in Somersetshire, in 1625. In 1645, he was chosen scholar of Wadham college, Oxford, and, in 1647, he took the degree of B. A. On leaving the university, he obtained the living of Bishop's-Nymmet, in Devonshire, where he devoted himself to his studies, particularly to the mathematics. He published the Geometrical Key, or the Gate of Equations unlocked, &c. 1684, 4to. Not long before his death, the Royal Society sent him some questions, which he solved in so satisfactory a manner, that they presented him with a medal, with a flattering inscription upon it. He died at his vicarage in 1690.

BAKER (Henry), an eminent naturalist, was born in London, and brought up to the business of a bookseller, which profession he quitted, and undertook to teach deaf and dumb persons to speak, by which he acquired a handsome fortune. He married a daughter of Daniel de Foe, by whom he had two sons. In 1740, he was chosen fellow of the Antiquarian and Royal Societies, and from the latter he received, the same year, sir Godfrey Copley's gold medal for his microscopical experiments on saline particles. He died in 1774, above seventy years old. He published the Microscope made easy, 8vo. 1742, and Employment for the Microscope, 8vo. 1764. He also wrote Original Poems, serious and humorous, published in 8vo. 1725. But the best of his poetical performances, is The Universe, a poem, intended to restrain the pride of man, 8vo. Mr. Baker communicated a great number of curious papers to the Royal Society, which were inserted in the Philosophical Transactions (*Watkins*).

BAKEWELL, a pretty large town in Derbyshire, with a market on Mondays. Lat. 53. 15. N. Lon. 2. 42. W.

BAKEWELL (Robert), a celebrated farmer and breeder of cattle, was born in 1726, at his paternal estate of Dishley, in Leicestershire. He conducted the farm for several years before his father's death, and particularly turned his attention to improve the breed of his cattle, for which purpose he travelled all over England, and into Ireland and Holland. In a little time he had the satisfaction to see his endeavours crowned with success, and the Dishley sheep to be distinguished above all others. About 1760, he sold his sheep at not more than two or three guineas each. Some time afterwards he let out his rams, and for a few seasons received only fifteen shillings and a guinea each. At length he advanced his prices, and, in 1770, some of his rams were let for twenty-five guineas. Since then the prices and credit of his stock increased amazingly, so that single rams have been let for four hundred guineas! It is a fact, that one ram, called the *two pounder*, produced in one season the sum of eight hundred guineas, independent of ewes of Mr. Bakewell's own stock, which at the same rate would have made a total, the produce of a single ram, of 1200 guineas! The race of Dishley sheep are known by the fineness of their bone and flesh, the lightness of the offal, the disposition to quietness, and, consequently, to mature and fatten with less food than other sheep of equal weight. He also greatly improved his black cattle, and frequently let his bulls at fifty guineas a season each! Mr. Bakewell died in 1795. He was a pleasant, hospitable, and intelligent man, and particularly humane to his beasts (*Watkins*).

BAKING, the art of preparing bread, or reducing meals of any kind, whether simple or compound, into bread. (See the article BREAD.) The various forms of baking among us may be reduced into two, the one for unleavened, the other for leavened bread. For the first, the chief is manchet-baking, the process whereof is as follows: The meal, ground and bolted, is put into a trough, and to every bushel are poured in about three pints of warm ale, with barm and salt to season it. This is kneaded well together with the hands through the brake, or, for want thereof, with the feet, through a cloth: after which, having lain an hour to swell, it is moulded into manchets, which, scored in the middle, and pricked at the top, to give room to rise, are baked in the oven by a gentle fire. For the second, sometimes called *cheat-bread baking*, it is thus: Some leaven (saved from a former batch) filled with salt, laid up to sour, and at length dissolved in water, is strained through a cloth into a hole made in the middle of the heap of meal in the trough, then it is worked with some of the flour into a moderate consistence: this is covered up with meal, where it lies all night, and in the morning the whole heap is stirred up, and mixed with a little warm water, barm, and salt, by which it is seasoned, softened, and brought to an even leaven: it is then kneaded, moulded, and baked, as before.

A proper degree of heat is an essential requi-

ate to the baking process. When the inner arch of the oven appears entirely white, it is generally considered as sufficiently heated. But this being a fallacious criterion, we would recommend the following. Place a handful of flour before the aperture of the oven, and if it turn of a brown colour, the heat is then nearly of the degree required, but if it become black, or remain white, in the former case the fire must be considerably reduced, and in the latter more fuel must be added. Lastly, all parts of the oven should be uniformly heated, and though we cannot enter into farther particulars, yet the attentive housewife will easily, from her own observations, regulate the degree of heat, with the same effect as it might be done by Mr Wedgewood's pyrometer for the baking of earthen-ware.

Musty flour, when baked into bread, is not only extremely detrimental to health, but it also imparts a bitter and nauseous taste. When such flour is not too strongly tainted, it may be corrected by first kneading it with leaven or sweet barm, then making large holes with a wooden cylinder in the dough, filling up the cavities with flour that is perfectly sweet, suffering it to remain in this preparatory state till the next morning, then removing the dry flour carefully with long spoons or similar implements, and afterwards converting the dough into bread, with the addition of such flour as is not musty. By this simple process, the flour first mixed up will be sweetened, but that which has been left over night in the dough is said to become so corrupted that it can be given only to animals.

It has frequently been attempted, and not without success, to bake good, wholesome bread, with little or no barm. In consequence of a dispute between the brewers and bakers of Dublin, concerning the price of yeast, in the year 1770, the latter carried the point, by making their bread without it. As this process, however, could not be readily imitated in domestic life, we shall here state *a method of raising a bushel of flour with a tea-spoonful of barm*, first practised by James Stone. It is as follows. Put a bushel of flour into the kneading-trough or trendle, take about three-quarters of a pint of warm water, and thoroughly mix with it a spoonful of thick, sweet barm, then make a hole in the middle of the flour, large enough to contain two gallons of water, pour in your small quantity, and stir it with a stick, so that it may, with some of the flour combining with it, acquire the consistence of batter for pudding, then strew a little dry flour over it, and let it stand for about one hour, when you will find the small portion so raised, that it will break through the dry flour scattered over it. After this, pour in another quart of warm water, while you are stirring in more flour, till it become as thick as before, then again shake dry flour over it, and leave it for two hours longer—repeat the same method about twice more, always suffering it somewhat longer to be at rest, and the bread will become as light as if a pint of barm had been used. Nor does this method require above a quarter of an hour more time than the usual way of baking, and the author of it asserts that his bread has *never* been heavy nor bitter.

With respect to the difference of seasons, J Stone directs that, in summer, the water should be used blood warm; in winter, or cold frosty weather, as hot as the hand can bear it without pain, while in the former season the dough should be covered up very warm, and strewed over with dry flour every time tepid water is added, to keep in the heat; after using six or eight quarts of such water to every bushel of flour, in the gradual manner before described, it will be found that the whole body of flour which is mixed with the warm water, by means of a single tea-spoonful of barm, is brought into considerable agitation, so that it waxes or ferments without difficulty. See also YEAST.

BALA, a town of Merionethshire, in North Wales, with a market on Saturdays. Lat 52 50 N Lon 3 35 W.

BALAAM, in scripture biography, the son of Bosor, a prophet or diviner of the city of Pethor, on the Euphrates. See Numbers, xxii, xxiii, xxiv. Deut xxiii.

BALÆNA, whale, in zoology, a genus of the class mammalia, order cete. Toothless, and instead of teeth horny laminæ in the upper jaw, spiracle, with a double opening on the top of the head. See Nat Hist pl XXIX.

1 B mysticetus. Common whale, or great mysticete.
2 B physalus. Fin fish.
3 B boops. Pike headed whale.
4 B gibbosa. Hump whale.
5 B musculus. Broad-nosed whale.
6 B rostrata. Beaked whale.

Of b mysticetus, or common whale, there are three varieties.

α nostrils flexuous, on the fore part of the head, with a dorsal fin.

β body black with a whitish gloss.

γ larger and without spiracle.

This species inhabits the seas towards the arctic pole, is timid, and swims with great velocity, feeds chiefly on crabs, and medusæ, is sought after for the sake of its blubber, and the horny laminæ in the upper jaw, usually called whale bone; teats two, proportionally small, gravid from nine to ten months, produces one young, rarely two; measures from fifty to a hundred feet in length. Head about a third part of the body, flattish above, with a tubercle, in which is found a spiracle or opening; mouth long, curved like the italic letter *f*, lower jaw very broad in the middle; tongue soft, white, adhering to the lower jaw, spotted with black at the sides, eyes size of an ox's, lateral, remote, above the ears, skin an inch thick, tail slightly bifid, from the centre of which a sharpish angular ridge runs up the middle of the back.

The remainder of the history of the mysticete, or common Greenland whale, we shall present to the reader in the language of Fre-

deric Martens, in his voyage to Spitzbergen, as corrected by Dr Shaw

"Just before, on the under lip, is a cavity or hole, which the upper lip fits exactly into, as a knife into a sheath I do really believe that he draweth in the water that he bloweth out through this hole, and so I have also been informed by seamen Within his mouth is the whalebone, all hairy as a horse's hair, and it hangs down from both sides all about his tongue The whalebone of some whales is somewhat bended like a cimeter, and others like a half-moon The smallest whalebone is before, in his mouth, and behind towards his throat, and the middlemost is the largest and longest, being sometimes about two or three men's length, from whence may be conjectured how large the animal must be On one side, all in a row, there are two hundred and fifty pieces of whalebone, and as many on the other, making in all five hundred, and there are still many more, for the cutters let the least of all remain, because they cannot easily come at it to cut it out, on account of the meeting of the two lips, where the space is very narrow The whalebone is in a flat row, one piece by the other, somewhat bending within and towards the lips, every where like a half-moon it is broad at the top, where it sticketh fast to the upper lip, every where overgrown with hard white sinews towards the root, so that between two pieces of whalebone you may put your hand These white sinews are of an agreeable smell, break very easily, and may be boiled and eaten Where the whalebone is broadest, is underneath by the root, there groweth small whalebones, the other greater, as you see small and large trees one among another in a wood I believe the small whalebone doth not grow bigger, as one might think that some of the great pieces thereof might come out, and that so this small whalebone might come up again in the room thereof, or as, in children, the hair grows again when cut but it is not so, for it is from one end to the other of an equal thickness, and full of long jacks, like horse's hair The whalebone is underneath narrow and pointed, and all overgrown with hair, that it may not hurt that which is young but, without, the whalebone hath a cavity, for it is turned just like unto a gutter wherein the water runs, where it lieth the one over the other, like the shields or plates of crawfish, or the pantiles of a house that lie one over the other, for else it might easily wound or hurt the under lip

"To cut the whalebone out is a particular trade, and abundance of iron tools are used in the process The lower part of the whale's mouth is commonly white The tongue, which is about the size of a great feather-bed, lieth among the whalebone, being very closely tied to the undermost chap or lip It is white with black spots at the edges, and consists of a soft, spongy, fat substance, which cannot easily be cut, being at once tough and yielding so that it is thrown away by the whale-catchers for this reason, otherwise they might get five, six, or seven barrels of oil from it. Upon the head is the hoffel, or bump before the eyes and fins, and at the top of it are situated the spout-holes, one on each side over against each other, shaped like the letter S, or the hole on each side a violin From these holes the whale bloweth or spouteth the water, fiercest of all when he is wounded, when it sounds like the roaring of the sea in a great storm, or as we hear the wind in very tempestuous weather. it may be heard at a league's distance, though you cannot see the fish by reason of the thick and foggy air

"The head is not round at the top, but somewhat flat, and goes down sloping, like the tiling of a house, to the under lip The under lip is broader than any part of the body, and broadest of all in the middle In a word, the whole fish is shaped like a shoe-maker's last, if you look upon it from beneath Behind the knob or bump, between that and the fins, are placed the eyes, which are not much bigger than those of a bullock, with eye-lids and hair like the human eyes The crystal (crystalline humour) is not much bigger than a pea, clear and transparent as crystal The eyes of the whale are placed very low, almost at the end of the upper lip Some bring with them from Spitzbergen some bones which they call the ears of the whale, but this I can say nothing to, because I never saw any, but very well remember that I have heard that they lie very deep The whale doth not hear when he spouts the water, wherefore he is easiest to be struck at that time His belly and back are quite red, and underneath the belly they are commonly white, yet some are coal black Most of those which I saw were white They look very beautiful when the sun shines upon them, the small clear waves of the sea, that are over him, glistening like silver Some of them are marbled on the back and tail Where a whale has been wounded there remaineth always a white scar I understood from one of our harpooners that he once caught a whale at Spitzbergen that was white all over Half white I have myself seen, but one above the rest, which was a female, was a very beautiful one, she was all over marbled black and yellow Those that are black are not all of the same colour, for some are as black as velvet, others coal black, and others of the colour of a tench. The whale loseth its beautiful colours when it grows dry, the black becoming brownish, and the white losing its clearness When they are well they are as slippery as an eel, but one may stand upon them, because they are so soft that the flesh giveth way to our weight The outward skin is thin, like parchment, and is easily pulled off by the hand when the flesh grows hot by the fermentation of the inward parts after the animal's death The bones of the whale are hard, like those of large, four-footed beasts, but porous like a sponge, and filled with marrow, and when that is consumed out they will retain a great quantity of water, for the holes are large, like those of an honeycomb Two great and strong bones hold up the upper lip, they lie one against the

other, and both together make a figure like a half-moon, but one by itself is like a quarter of a circle Some of these I have seen lying on the coast of Spitzbergen, about twenty feet long, of a white colour, as if calcined The flesh of the whale is coarse and hard, like that of a bull, it is intermixed with many sinews, and is very dry and lean when boiled, because the fat is only between the flesh and skin If suffered to lie a little, it soon becomes black and tainted That of the tail boils the tenderest, and is not quite so dry as that of the body When we have a mind to eat of a whale, we cut great pieces off before the tail, where it is four-square, and boil it like other meat, good beef I prefer far before it, yet rather than be starved I advise to eat whale s flesh, for none of our men died of it, and the Frenchmen did eat it almost daily, flinging it on the tops of their tubs, and letting it lie till it was black, and yet eating it in that condition The flesh of the whale, like that of seals, is alone or by itself, and the fat at the top thereof between the flesh and skin The fat is about six inches thick on the back and belly, but I have also seen it a foot thick on the fins, and more than two feet on the under lip, but whales vary in this respect like other animals, according to size and health

"In the fat are interspersed little sinews, which hold the oil as a sponge does water which one may squeeze out, the other strong sinews are chiefly about the tail, where it is thinnest, for with it he turns and winds himself about, as a ship is turned by the rudder, his fins being his oars, and according to his size he rows himself along with them as swifly as a bird flies, and makes a long track in the sea, as a great ship doth when under sail, so that it remains divided for a while Over the fat is, besides the uppermost skin already described, another skin about an inch thick, proportionable to the size of the whale It is coloured according to the colour of the animal, if the whale be black this is black also, if, on the contrary, the outward or parchment-like skin be white or yellow, the thick under skin is of a similar colour This thick skin is not tough or tenacious, but of a fungous texture, and of no use as an article of trade The food of the whale is believed to be small sea-snails (the clio limacina of Linnéus) which float in vast abundance on the surface of the northern seas Whether these afford such great nourishment I cannot tell I have been informed by others that about Shetland a small whale was caught which had about a barrel of herrings in its belly The middling sized whales caught at Spitzbergen afford seventy, eighty, or ninety cardels of fat Our biggest whale was fifty-three feet long, and his tail three fathoms and a half broad The whale swims against the wind, like most of this tribe, and indeed as most large fishes do They are sometimes found diseased and emaciated, having their peculiar disorders like other animals The breasts of the female resemble those of a cow, having similar nipples, the females are sometimes white and sometimes spotted with black and blue spots, in the manner of a plover's egg"

To this we shall add, that the cub, when protruded at the end of nine or ten months, the full time of parturition, is black and about ten feet long The mutual tenderness of the male and female for each other, as well as of the latter for its offspring, is exceeded by no tribe of animals The male will seldom or never quit the female if wounded, but join in her resistance, and share her fate, nor will the female quit its wounded cub, but partake of its death or ensure its victory

The whale is taken by being struck with harpoons by several persons, who pursue him in boats, arranging themselves according to circumstances, and wounding the animal repeatedly, till faint with loss of blood, he at length expires and lies floating on the surface The harpoon is a sharp iron in the form of an arrow head, fixed to a rod, and furnished with a vast length of line of a proper strength The wounded whale swims away, often drawing both boat and line after him as swift as the wind, spouting the water with violence, and tinging the sea all around with his blood The noise, says Martens, may be heard as far as a cannon, but after having received several wounds at different intervals, it grows weaker, till at length it resembles that of the wind blowing slightly into an empty vessel

This is a dangerous occupation, and requires great dexterity on the part of the adventurers A long boat, continues our author, he valueth no more than dust, for he can beat it all in shatters at a blow The desire of gain however is a sufficient temptation to those who undertake this fishery, and the profits seldom fail to recompense their labours We believe the common mode of pay is dependant upon the success that may be met with

Though the chief residence of this and most other whales is in the polar regions, yet they sometimes stray into more temperate latitudes, and are occasionally seen in very different parts of the ocean from those in which they generally reside Of the other species our account must be short, as it is needful that we should be very minute, and they are less useful in common life, and consequently less sought for in commerce

B Physalus, fin-fish, or fin-backed mysticete; has spiracles double on the middle of the fore part of the head, at the extremity of the back a soft fin Inhabits the American and European seas, equalling the great mysticete in length, but much more slender and less fat, mouth larger, whalebone shorter, blue, ejects water from the spiracles with still greater force body brown, shining, beneath white, dorsal fin straight, acute, from three to four feet long

B Boops, pike-headed whale or mysticete, is characterised by spiracles double on the snout, a horny protuberance at the extremity of the back Inhabits the north and south oceans, forty-six feet long, very smooth, black, belly white, longitudinally wrinkled Head

oblong; snout sharpish, tongue five feet long, like that of an ox, eyes placed near the angles of the mouth

B Gibbosa Hump-whale, or knobbel mysticete Back gibbous without dorsal fin There are two varieties α, with a single hump or bunch on the back, β, with six bunches on the back Inhabits the coasts of New England, and its gibbosity is about the size of the human head It has not been hitherto described accurately

B musculus broad-nosed whale, or under-jawed mysticete Spiracles double on the forehead, under jaw very broad Inhabits the coasts of Scotland, seventy eight feet long

• B rostrata beaked whale, rostrated mysticete Nose elongated to a peak dorsal fin fat Inhabits the seas of Norway, rarely of England, twenty-five feet long, very black, resembles b boops, swims rapidly

BALÆNARUM, in entomology, a species of phalangium, with two feelers and an ovate body

BALAGATE, a province of Mogulstan, the largest of the three that compose the kingdom of Decan

Balagate mountains, those mountains which divide the Malabar from the Coromandel coast

BALAGNA, a small province in the northern part of the island of Corsica

BALANCE, s (*balance*, Fr) Used in various senses 1 A pair of scales, 2 The act of comparing two things, 3 The overplus of weight, 4 Equipoise Of the first of these, as well as some others, we must speak more fully below

Balance, or Ballance, in mechanics, a peculiar application of that simple mechanical power called the lever, by which it is rendered useful in determining the difference or equality of weights in heavy bodies, and consequently their masses or quantities of matter The characteristic difference between a balance and a lever we conceive to consist in this, that the former is suspended from something which is above it, the latter supported by a prop or fulcrum below it

There are two kinds of balances, the ancient and the modern The ancient or Roman balance, called also *statera Romana* or steelyard, consists of a lever or beam, moveable on a centre, and suspended near one of its extremes, on one side the centre are applied the bodies to be weighed, and their weight is measured by the division marked on the beam, on the other side is the place where a weight moveable along it keeps the balance in equilibrio This kind of balance is still frequently used in weighing heavy bodies, as butcher s meat, &c It may be so contrived as to determine very great weights with convenience and accuracy (See Steelyard) The modern balance consists of a lever or beam suspended exactly by the middle, to the extremes whereof are hung scales or basons

In each case the beam is called the jugum, and the two moities thereof on each side the axis, the brachia or arms, and the handle whereby it is held, trutina, the line on which the beam turns, or which divides its brachia, is called the axis, and, when considered with regard to the length of the brachia, is esteemed but a point, and called the centre of the balance, and the places where the weights are applied, the points of suspension or application That slender part perpendicular to the jugum, whereby either the equilibrium or preponderancy of bodies is indicated, is called the tongue of the balance In the Roman balance, therefore, the weight used for a counterbalance is the same, but the points of application are various, in the common balance the counterpoise is various, and the point of application the same The principles on which the use of each is founded may be readily understood from the following observations, and the general properties of the lever

The beam, fig 1 pl 22 if suspended from a hook or nail by the ring *k*, which is connected with its centre of motion will be a lever of the first kind, and its mechanism will depend upon the properties of that power Hence, as the quantity of matter, or proportional known weight, is to its distance from the centre of motion, so is the distance of the unknown weight to its quantity of matter Thus AB, fig 1 representing an instrument of this kind, *a*, the trutina or handle on which the beam turns, *k*, a ring on which the balance may be suspended on a nail or hook, *f*, the hook on which the body to be weighed is hung, *c*, a collar or guard by which the hook *f* is fastened to the beam, *g*, a moveable collar, *h*, a swivel, *i*, the counterpoise From what has been said it evidently follows, that if the body to be weighed be fastened to the hook *f*, and the whole suspended by the ring *k*, the division on which the counterpoise is placed to maintain an equilibrium in the balance, will show the weight of the body required, provided the weight of the counterpoise *i* be known, and the large divisions 1, 2, 3, &c be equal to the distance between the centre of the balance and the screw which fastens the guard *c* to the shorter arm of the balance It will also be necessary that the steelyard itself, with its whole apparatus, exclusive of the counterpoise, be in equilibrio when suspended on the ring *k* If the body to be weighed be heavier than the divisions on the longer arm will indicate, the balance is turned the lower side upwards, and suspended on the other ring *b*, by which means the divisions become shorter, because the distance between the trutina *d*, and the screw on which the guard *c* moves, is less the divisions in the figure on this side extending to 17, whereas they extend only to 6 on the other It will be unnecessary perhaps to observe, that the same precaution, with regard to the centre of gravity when the balance is suspended, is also necessary when this side of the balance is used, as we before mentioned with regard to the other

The modern balance, which, as before ob-

served, has equal brachia or arms, is represented in fig 2 If the arms be equal both in weight and length, as they always are where no deception is intended, equal weights placed in the scales will keep the whole in equilibrio If the centre of such a balance, scales and weights, be in the centre of motion B, an equilibrium obtains in every position of the balance, but if this centre be above or below B, the balance cannot be q escent, till the right line joining B and this centre be perpendicular to the horizon The best position, therefore, of the centre of gravity is below B, and as little below it as possible, that the arcs described by it during its vibration may be small and soon described The points of suspension, A and C, should be in the same right line with the centre of motion The equilibrium of the balance will be affected by the tongue B*o*, unless it be continued below the centre of motion, so that the moments on both sides may be equal and opposite Since the moment of a given body vari s its distance from the fulcrum, the longer t arms of the balance are (within convenient limit), the more distinguishable will be the effe of slig t differences in the weights at D and E Minute differences of weight are also rendered more discernible by diminishing the friction upon the axis, as by suspending it in a fork, with springs, &c &c

The Deceitful Balance operates in the same manner as the steelyard, and cheats or deceives by having one arm a little longer t n the other, though the deception is not perceived because the shorter arm is made somewhat heavier, so as to compensate for its shortness, by which means the beam of the balance, when no weights are in the scales, hangs horizontal in equilibrio The consequence of this construction is, that any commodity put in the scale of the longer arm, requires a greater weight in the other scale to balance it, and so the body is fallaciously accounted heavier than it really is But the trick will easily be detected by making the body and the weight change places, removing them to the opposite scales, when the weight will immediately be seen to preponderate The true weight will be a geometrical mean proportional between the two false weights

The Bent Lever Balance is represented in fig 3 Here ABC is a bent lever supported on its axis B in the pillar IH At A is suspended the scale F, and a C is affixed a weight or a heavy knob Draw the horizontal line KBG through B, the centre of motion, on which from A and C let fall the perpendiculars AK, CD, then, if BK and BD are reciprocally in proportion to the weights at A and C, they will be in equilibrio, but if not, the weight C will move one way or other along the arc FG, till that ratio be obtained If the lever be so bent that when A coincides with the line GK, C coincides with the vertical line BH, then as C moves along from F to G, its momentum will increase, whilst that of a weight in the scale E will decrease, hence, the weights in E corresponding to different positions of the balance, may be expressed on the graduated arc of the plate FG, and the whole may be used in the same way as a steelyard

Compound Balance is a combination of two, three, or more balances, serving for the weighing of very heavy weights, as anchors, great guns, &c In such balances the power is to the weight, as the product of the lengths of the arms lying on the contrary sides of the fulcra to the power, to the product of the length of the other arms

Danish Balance is a kind of balance or steelyard in common use upon various parts of the continent of Europe It consists of a batten of hard wood, having a heavy lump or knob at one end, and a swivel hook at the other The goods to be weighed are suspended on the hook, and the whole is carried in a loop of whip cord, in which it is slidden to and fro (when placed horizontally), till the goods suspended from the hook at one end are balanced by the knob at the other The weight of the goods is estimated by the contact of the loop with a scale of divisions in harmonic progression For the construction of this scale, with diagrams, see Gregory s Mechanics, vol ii p 90

Balance for Woollen Manufacturers resembles the beam of a common pair of scales applied to a brass graduated ring, whose centre is the centre of motion of the beam At one end of the beam is a fixed weight or counterpoise, at the other a hook In sorting the skeins of worsted, that to be examined is put upon the hook, and sinks down more or less, according to its weight, till the counterpoise by rising balances it, and then the index or cock of the beam points out, on the graduated arch, the number of skains of that kind which go to the pound This balance was invented by the Rev W Ludlam, who has pointed out the minutiæ of its construction in the Phil Trans vol lv See also part xlvi of the new abridgment by Dr Hutton, &c

Assay Balance, a very delicate balance used for determining the exact weight of minute bodies in the different processes of assaying, and may often be employed with advantage in chemical analysis, when extreme accuracy is required This balance should be made of the best steel and highly polished, and as, from its delicacy, it is tremulous with the least motion of the air, as well as rendered false by the adhesion of dust, it is necessary to enclose it in a case, as represented in fig 5 pl 22 having glasses, *a*, *a*, *a*, at top and all round it, in order to observe what is within By moving the little weight or ring *b*, which is connected with the balance by means of a string, the balance itself is either lifted up or let down The bodies to be weighed and the weights themselves are put into small silver dishes, which must weigh exactly alike, and which, when loaded, must be placed carefully in the scales, through the side windows, which slide or open for the purpose When any thing is to be added to or

taken out of them it is done with the small pincers, or if it be powder, with the small shovel or spoon but the balance must be let down every time, that the scales may rest upon the bottom of the case; and the windows must be shut before the balance is lifted up again, especially if the air is not perfectly calm Citizen Prony has invented a support for assay and other balances of all dimensions, which renders their operations very expeditious and accurate It is described in Annales de Chimie, xxxvi 50, also in Nicholson's Journal, 4to, vol v 303, and in Gregory's Mechanics, vol ii p 91

Hydrostatic Balance, an instrument contrived to determine accurately the specific gravity of both solid and fluid bodies It is constructed in various forms, but we shall content ourselves here with describing that which appears of all others the most accurate VCG in fig 4 pl 22 is the stand or pillar of this hydrostatic balance, which is to be fixed in a table From the top A hangs, by two silk strings, the horizontal bar BB from which is suspended, by a ring *i*, the fine beam of a balance *b*, which is prevented from descending too low on either side by the gently springing piece *txyz*, fixed on the support M The harness is annulated at *o*, to show distinctly the perpendicular position of the examen, by the small pointed index fixed above it

The strings by which the balance is suspended, passing over two pulleys, one on each side the piece at A, go down to the bottom on the other side, and are hung over the hook at *t*, which hook, by means of a screw P, is moveable about one inch and a quarter, backward and forward, and therefore the balance may be raised or depressed so much But if a greater elevation or depression be required, the sliding piece S, which carries the screw P, is readily moved to any part of the square brass rod VK, and fixed by means of a screw

The motion of the balance being thus adjusted, the rest of the apparatus is as follows HH is a small board, fixed upon the piece D, under the scales d and e, and is moveable up and down in a low slit in the pillar above C, and fastened at any part by a screw behind From the point in the middle of the bottom of each scale hangs, by a fine hook, a brass wire *ad* and *ac* These pass through two holes *mm* in the table To the wire *ad* is suspended a curious cylindric wire *rs*, perforated at each end for that purpose this wire *rs* is covered with paper, graduated by equal divisions, and is about five inches long

In the corner of the board at E is fixed a brass tube, on which a round wire *hl* is so adapted as to move neither too tight nor too free, by its flat head I Upon the lower part of this moves another tube Q, which has sufficient friction to make it remain in any position required to this is fixed an index T, moving horizontally when the wire *hl* is turned about, and therefore may be easily set to the graduated wire *rs* To the lower end of the wire *rs* hangs a weight L, and to that a wire *pn*, with a small brass ball *g* about one fourth of an inch diameter On the other side, to the wire *ac*, hangs a large glass bubble R by a horse hair

Let us first suppose the weight L taken away, and the wire *pn* suspended from *s* and, on the other side, let the bubble R be taken away, and the weight F, suspended at *c*, in its room This weight F we suppose to be sufficient to keep the several parts hanging to the other scale in equilibrium, at the same time that the middle point of the wire *pn* is at the surface of the water in the vessel O The wire *pn* is to be of such a size that the length of one inch shall weigh four grains

Now it is evident, since brass is eight times heavier than water, that for every inch the wire sinks in the water, it will become half a grain lighter, and half a grain heavier for every inch it rises out of the water consequently, by sinking two inches below the middle point, or rising two inches above it, the wire will become one grain lighter or heavier Therefore, if when the middle point is at the surface of the water in equilibrio, the index T be set to the middle point *a* of the graduated wire *rs*, and the distance on each side *ar* and *as* contains 100 equal parts; then, if in weighing bodies the weight is required to the hundredth part of a grain, it may be easily had by proceeding in the following manner

Let the body to be weighed be placed in the scale d Put a weight into the scale e, and let this be so determined, that one grain more shall be too much, and one grain less too little Then the balance being moved gently up or down, by the screw P, till the equilibrium be nicely shewn at *o*, if the index T be at the middle point *a* of the wire *rs*, it shows that the weights put into the scale e are just equal to the weight of the body By this method we find the absolute weight of the body the relative weight is found by weighing it hydrostatically in water, as follows

Instead of putting the body in the scale e, as before, let it hang with the weight I, at the hook *c*, by a horse-hair, as at R, supposing the vessel N of water were away The equilibrium being then made, the index T standing between *a* and *r*, at the 36 division, shows the weight of the body put in to be 1095,36 grains As it thus hangs, let it be immersed in the water of the vessel N, and it will become much lighter the scale e will descend till the beam of the balance rest on the support *z* Then suppose 100 grains put into the scale d restore the equilibrium precisely, so that the index T stand at the 36 division above *a*, it is evident that the weight of an equal bulk of water would, in this case, be exactly 100 grains After a like manner, this balance may be applied to find the specific gravity of liquids, as is easy to conceive from what has been already said

Balance of a Clock or Watch is that part

which, by its motion, regulates and determines the beats The circular part of it is called the rim, and its spindle the verge, there belong to it also two pallets or nuts, that play in the fangs of the crown-wheel in pocket watches, that strong stud in which the lower pivot of the verge plays, and in the middle of which one pivot of the crown-wheel runs, is called the potence the wrought piece which covers the balance, and in which the upper pivot of the balance plays, is the cock, and the small spring in the new pocket watches is called the regulator The motion of a balance, as well as that of a pendulum, being alternate, while the pressure of the wheels is constantly in one direction, it is obvious that some art must be used to accommodate the one to the other When a tooth of the wheel has given the balance a motion in one direction, it must quit it, that it may get an impulsion in the opposite direction The balance or pendulum thus escaping from the tooth of the wheel, or the tooth escaping from the balance, has given to the general construction the name of scapement among our artists (See SCAPEMENT) Before the admirable invention of the pendulum, clocks were regulated by an horizontal balance having a vertical axis, that passed through two holes, with liberty to play up and down, and that suspended by means of a string passed through a hole in the axis and fastened at both ends, so as to form equal angles with the axis itself Consequently, when the balance revolved in one direction, the string was wound upon the verge, and, being thus shortened, raised it up until the weight of the balance had overcome the force of rotation after which it revolved the contrary way, and descended to perform a similar ascent by winding the string the opposite way

Balance of Power, a term which implies the general system of international relations, which has grown up in modern Europe To one class of politicians this term has afforded a constant subject of ridicule and invective, and to another class the frequent opportunity of defending or attacking every measure, of discussing, or affecting to discuss, every political subject by a reference to certain terms of art, of which but few understand the meaning and force It is not in the mere plan of forming offensive or defensive alliances, or in the principle of attacking a neighbour, in order to weaken his power, before he has betrayed hostile views, or in the policy of defending a rival, in order to stay, in proper time, the progress of an enemy it is not in these simple maxims that the modern system consists These are, indeed, the elements, the great and leading parts of the theory, they are its most prominent features, they are maxims dictated by the plainest and coarsest views of political expediency but they do not form the whole system, nor does the knowledge of them (for it cannot be pretended that ancient states were in possession of any thing beyond the speculative knowledge of them), comprehend an acquaintance with the profounder and more subtile parts of modern policy The grand and distinguishing feature of the balancing theory, is the systematic form to which it reduces those plain and obvious principles of national conduct, the perpetual attention to foreign affairs, which it inculcates, the constant watchfulness over every motion in all parts of the system which it prescribes, the subjection in which it tends to place all national passions and antipathies to the views of remote expediency, the unceasing care which it dictates of nations most remotely situated, and apparently unconnected with ourselves, the general union which it has effected of all the European powers in one connected system—obeying certain laws, and actuated in general by a common principle, in fine, as a consequence of the whole, the right of mutual inspection, now universally recognised among civilized states, in the rights of public envoys and residents This is the balancing theory It was as much unknown to Athens and Rome, as the Keplerian or Newtonian laws were concealed from Plato and Cicero It has arisen, in the progress of science, out of the circumstances of modern Europe—the greater extent and nearer equality of the contiguous states—the more constant intercourse of the different nations with each other We have been told by Robertson and other historians, that the principle of the balance of power was a discovery of the 15th century, made by the Italian politicians, in consequence of the invasion of Charles VIII Against such statements we might adduce the arguments of Mr Hume and others, who have traced in ancient times vastly more refined notions of policy than any that dictated the Italian defensive league It was not, in truth, to any such single event that the balancing system owed either its origin, or its refinement, but to the progress of society, which placed the whole states of Europe in the same relative situation in which the states of Italy were at that period, and taught them not to wait for an actual invasion, but to see a Charles at all times in every prince or commonwealth that should manifest the least desire of change *Edinburgh Review*, vol I p 354

Balance of Trade denotes an equality between the value of commodities bought of foreigners, and the value of the native productions transported into other nations It is necessary that this balance be kept in trading nations, and if it cannot be made in commodities, it must in specie Hereby it is, that we know whether a nation gains or loses by foreign trade, or any branch thereof, and consequently, whether that nation grows richer or poorer There are divers methods of arriving at this knowledge, but the specific rules are too complex to be satisfactorily explained here

Balance, in commerce, that which is wanting to make the two sides of an account even In the method of book-keeping by double-entry, if the debets and credits as arising from

every account, real and fictitious, be set in two separate columns, and added up, the sums arising thence will always balance, or be equal to each other, if the accounts are correctly kept

To BA'LANCE *v a* (*balancer*, Fr) 1 To weigh in a balance (*L Estrange*) 2 To keep in a state of just proportion 3 To counterpoise (*Newton*) 4 To regulate an account (*Locke*) 5 To pay that which is wanting (*Prior*)

To BA'LANCE *v n* To hesitate, to fluctuate between equal motives (*Locke*)

BA'LANCER *s* (from *balance*) The person that weighs any thing

• BALANCING, among seamen, a singular method of contracting or reducing a sail in a tempest, in contradistinction to reefing, which is common to all the principal sails, whereas none are balanced but the mizen and mainsails set on booms

BALANCIER, a machine used in striking of coins, &c See COINAGE

BALANUS MYREPSICA See BEN NUX.

BALASORE, a sea-port town on the Bay of Bengal in the East Indies It is seated on a very fruitful soil The inhabitants make several sorts of stuffs of silk, cotton, and a kind of grass Lat, 21 20 N Lon 86 0 E

BALAUSTINE See PUNICA

BALAUSTINE FLOWER See GRANATUM

BALAUSTIUM, (*balaustium*) Flores balaustiorum Balaustine flower, as in the preceding article A large rose-like flower, of a deep red colour, the produce of the plant from which we obtain the granatum See GRANATUM

BALBEC, or BALBECK, a town of Asiatic Turkey, in Syria, celebrated by the ancients under the name of Heliopolis, is situated at the foot of the Anti-Libanus There are now to be seen large remains of one of the most beautiful temples in the world, supposed to have been dedicated to the worship of the sun, both the ancient and present name of the place signifies the city of the sun, but by whom or when built is not accurately determined In the time of Augustus it was a garrison town of the Romans, and the present temple is said to have been built by Antoninus Pius, instead of the ancient one gone to decay. Under Constantine it was neglected, and soon after turned into a Christian church, and continued so till the irruption of the Arabs, after that the church fell to decay, battlements were built round it, and from that time, being exposed to the fate of war, it fell rapidly to ruins The state of the city is not less deplorable added to the wretched government of the Turks, an earthquake in 1759 completed its destruction The inhabitants were computed at 5000 in 1751, which in the year 1784 were reduced to less than 1200, poor and indolent, cultivating a little cotton, maize, and water-melons, for their subsistence 110 miles S Aleppo, and thirty NNW Damascus Lat 34 22 N Lon 37 20 E

BALBUTIES, (*balbuties*, *balbus*, stammering) A defect of speech, and properly that sort of stammering in which the patient sometimes hesitates, and immediately afterwards speaks precipitately See PSELLISMUS

BALBYSIA, in botany, a genus of the class syngenesia, order polygamia superflua Receptacle chaffy, down sessile, feathery, calyx simple, eight leaved, florets of the ray three-parted One species only, a native of Mexico, with ascending bristly stems and yellow flowers

BALCONY, in architecture, a kind of open gallery made usually of wood or cast iron, fixed without the walls of buildings, and commonly about the middle of the front Balconies are generally contrived for the convenience of looking around, seeing processions, &c

BALD *a* (*bal*, Welsh) 1 Wanting hair (*Addison*) 2 Without natural covering (*Shakspeare*) 3 Unadorned, inelegant (*Dryden*) 4 Naked, without dignity (*Shakspeare*) 5 It was used by the northern nations to signify bold, and is still in use

BALDACHIN, in architecture, a canopy supported by pillars, with which altars are covered

BA'LDERDASH *s* rude mixture

To BA'LDERDASH *v a* To adulterate liquor

BALD-FACED, applied to a horse, when the greater part of his face is white

BALDIVIA, or VALDIVIA, a sea-port town of Chili, in South America It was built in 1551, by the Spanish general Baldivia, after he had conquered Chili The inhabitants amount to about 2,000 Lat 39 38 S Lon 73 20 W

BA'LDLY *ad* (from *bald*) Nakedly, meanly, inelegantly

BA'LDMONY *s* Gentian, a plant See MEUM ATHAMANTICUM

BA'LDNESS *s* (from *bald*) 1 The want of hair 2 The loss of hair (*Swift*) 3 Meanness of writing, inelegance

BALDNESS CALVITIES, in medicine, a falling off of the hair, especially from the sinciput, without being able to grow again, the moisture of the head, which should feed it, being dried up by some disease, old age, or the immoderate use of powder, &c It differs from *alopecia*, *area*, *ophiasis*, and *tinea*, as these all arise from some vice in the nutritious humour, baldness, from the defect of it But the distinction is not always observed by modern physicians When the eye lids shed their hair, it is called a ptilosis

Buffon says that the crown of the head, and the space immediately above the temples, are the parts which first become bald, but that the hair below the temples, and on the inferior part of the back of the head, seldom falls off He adds, baldness is peculiar to men women, in the most advanced age, though their hair becomes white, are seldom affected with baldness

BALDOCK, a town of Hertfordshire, in England, chiefly noted for its trade in malt Lat 52 2 N 0 5 W

BA'LDRICK *s* 1 A girdle (*Pope*) 2 The zodiack (*Spenser*)

BALE, in commerce, a term denoting a quantity of merchandize packed up in cloth, and corded round very tight, after being secured with hay, &c to preserve it from injury A bale of cotton yarn is from 3 to 4 hundred weight, of raw silk, from 1 to 4 hundred, of lockram or dowlass, either 3, 3½, or 4 pieces Bales should always be marked and numbered, that the merchants to whom they belong may easily know them

BALE-GOODS, such as are exported or imported in bales

BALE *s* (bæl, Sax) Misery (*Spenser*)

To BALE *v a* (from *bailler*, Fr) To lave, to throw out

To BALE *v n* (*emballer*, Fr) To make up into a bale

BALEARES, or BALEARIC ISLANDS, three islands in the Mediterranean, modernly called Majorca, Minorca, and Yvica, on the coast of Spain The word is derived from *βαλλειν*, *to throw*, because the inhabitants were expert archers and slingers, besides great pirates —Florus relates that in these isles mothers never gave children their breakfast before they had struck with an arrow a certain mark in a tree

BA'LEFUL *a* (from *bale*) 1 Full of misery, sorrowful (*Milton*) 2 Full of mischief, destructive (*Dryden*)

BALEFULLY *ad* (from *baleful*) Sorrowfully, mischievously

BALES (Peter) was a most famous master in the art of penmanship, or fair writing, and one of the first inventors of short-hand He was born in 1547, and is styled by Anthony Wood "a most dexterous person in his profession, to the great wonder of scholars and others " He is recorded for his skill in micrography, or miniature writing, in Hollinshed s Chronicle, anno 1575, and Mr Evelyn also hath celebrated his wonderful skill in this delicate operation of the hand " Hadrian Junius speaking as a miracle of somebody who wrote the Apostle s Creed, and the beginning of St John s Gospel, within the compass of a farthing, what would he have said, says Mr Evelyn, " of our famous Peter Bales, who, in the year 1575, wrote the Lord s Prayer, the Creed, Decalogue, with two short prayers in Latin, his own name, motto, day of the month, year of the Lord, and reign of the queen, to whom he presented it at Hampton court, all of it written within the circle of a single penny, inchased in a ring and borders of gold, and covered with a crystal so accurately wrought, as to be very plainly legible, to the great admiration of her majesty, the whole privy-council, and several ambassadors then at court " He was farther very dexterous in imitating handwriting, and about 1586 was employed by secretary Walsingham in certain political manœuvres We find him at the head of a school, near the Old Bailey, London, in 1590, in which year he published his Writing Schoolmaster, in three parts, the first teaching swift writing, the second true writing, the third fair writing In 1595, he had a great trial of skill, in the Black Friars, with one Daniel Johnson, for a golden pen of 20*l* value, and won it, and a contemporary author farther relates, that he had also the arms of calligraphy given him, which are, azure, a pen, or, as a prize, at a trial of skill in this art among the best penmen in London In 1597, here published his Writing Schoolmaster, which was in such high reputation, that no less than eighteen copies of commendatory verses, composed by learned and ingenious men of that time, were printed before it

BALESSAN, in botany See BALSAM

BALGUY (John), a learned English divine, was born at Sheffield, in Yorkshire, in 1686 he received his education under his father, who was master of the grammar school at Sheffield In 1702 he was admitted of St John s college, Cambridge, where he took his degrees in arts On entering into orders, he obtained a living in the county of Durham, where he continued for many years In the famous Bangorian controversy, Mr Balguy particularly distinguished himself on the side of bishop Hoadly, who, in return, gave him a prebendary in the church of Salisbury, in 1729, he was presented to the vicarage of Northallerton, in Yorkshire He died at Harrowgate in 1748 Mr Balguy was a deep thinker, and an elegant writer, he wrote, besides his tracts in the Bangorian dispute, 1 A Letter to a Deist, concerning the Beauty and Excellence of Moral Virtue, 8vo 1726 2 The Foundation of Moral Goodness, or a farther Enquiry into the Original of our Idea of Virtue, 1728 3 Divine Rectitude, or a brief Inquiry concerning the Moral Perfections of the Deity, particularly in Respect of Creation and Providence, 1730 4 An Essay on Redemption, 1741 5 Sermons on several Occasions, 2 vols 8vo The last of which is posthumous

BALI, an island of the East Indies, forming the north side of the Streights of Java, through which the East India ships sometimes return in their passage from China to Europe The inhabitants are Pagans, and very much addicted to war Lat 7 10 S Lon 115 50 E

BALIGNIA, a town of Novogorod, in Muscovy Lat 57 2 N Lon 45 40 E

BALISTES File fish, in zoology, a genus of the class pisces, order branchiostega Head compressed close to the body, with sometimes a spine between the eyes, mouth narrow, teeth in each jaw eight, of which the two anterior are longer, and three interior ones on each side, aperture of the gills narrow, above the pectoral fins, coverless, membrane two-rayed, body compressed, carinate on each side, rough, with very minute prickles, the scales joined together by the skin None of the fishes of this genus inhabit the seas of Europe, they are able to inflate the belly, which at that time is rough, with very minute prickles, they feed on other fishes, and many of them are of a vast size most of them are suspected to be poisonous Twenty-one species (See Nat Hist pl XIV) Of these the chief are

1. B monoceros, offering two varieties, but with a difference not important. Inhabits the seas of Asia and South America; one variety about a foot long, the other about three feet, feeds on young crabs, and polypes, body thin, varied with cinereous and brown: the larger variety is poisonous.

2. B. tomentosus. Head-fin two-rayed, body a little hairy on the hind part; inhabits the Indian seas: body thin, sides, on the upper part yellow, lower cinereous, beneath yellow, varied with oblong black spots.

3. B. aculeatus. First dorsal-fin three rayed, tail with recumbent spines at the sides. Inhabits the Indian and Red seas, feeds on young crabs, body covered with papillæ on the surface, disposed in an irregular quadrangle.

4. B. sinensis. Head with a single ray, ventral fin single. Inhabits the seas round Brasil and China, body broad, rough, sprinkled with small orange spots, cinereous at the sides, beneath whitish, flesh hardly eatable.

5. B. assasi. Body muricate with brown warts, tail with a triple row of black ones. Inhabits the Red sea, a span long, brown, belly white, vent black, surrounded by a tawny ring: flesh eatable, but insipid.

BALK. *s.* (*balk*, Dutch.) A great beam.

BALK. *s.* A ridge of land left unploughed.

To BALK. *v. a.* (See the noun.) 1. To disappoint, to frustrate (*Prior*). 2. To miss any thing (*Drayton*). 3. To omit, or refuse any thing (*Shakspeare*).

BALK, or BALKH, a province of Great Bukharia in Asia, about 360 miles long, and 250 broad, situated to the south of the province of Samarkand, and to the east of Bukharia Proper. It is the least of the three provinces that make up what is called Great Bukharia, but being extremely fertile and well cultivated the prince draws a great revenue from it. The country particularly abounds with silk, of which the inhabitants make pretty manufactures. The capital of this province is of the same name, and is thought by many to be the same as the ancient Bactra. Lat. 37. 0 N. Lon. 65. 20 E.

BALKERS, in the fishery, persons placed on rocks and eminences at sea to spy the herring shoals, and give notice to the fishermen where they may be found.

BALL, in a general sense, is a spherical and round body, whether naturally so, or formed into that figure by art. The term, when used in the military art, comprehends all sorts of bullets for fire-arms, from the cannon to the pistol. Cannon-balls are made of iron, musket-balls, pistol-balls, &c. are of lead. The experiment has been tried of iron balls for pistols and fusees, but they are justly rejected, not only on account of their lightness, which prevents them from flying straight, but because they are apt to furrow the barrel of the pistol, &c.

BALL OF A PENDULUM, the weight at the bottom. In shorter pendulums this is called the bob.

BALL, in pyrotechnics, is also a composition of various combustible ingredients, serving to burn, smoke, give light, &c. In this sense we read of fire-balls, light-balls, smoke-balls, stink-balls, sky-balls, water balls, land-balls.

BALL, among the Cornish miners, signifies a tin-mine.

BALL, among printers, a kind of wooden tunnel stuffed with wool, contained in a leather cover, which is nailed to the wood, with which the ink is applied on the forms to be wrought off. See PRINTING.

BALL. *s.* (*bal*, French.) An entertainment of dancing.

BALL AND SOCKET is an instrument made of brass, with a perpetual screw, so as to move horizontally, vertically, and obliquely, and is generally used for the managing of surveying and astronomical instruments.

CANNON BALLS are distinguished by their calibres thus:

A 42	pound ball, the diameter of which is	6.684 inches
32		6.105
24		5.547
18		5.040
12		4.403
9		4.000
6		3.498
3		2.775
2		2.423
1		1.923

HORSE-BALLS, a form of medicine in use among farriers, similar to the boluses of the apothecary. They are well adapted for such medicines as operate in small doses, and as they dissolve with some difficulty, the effect produced by them must be more gradual and lasting than any other form of medicine, which circumstance should always be particularly considered, as it is of as great disadvantage in some cases as it is of service in others.

BALLS, (Martial), or BALLS OF MARS, in chemistry a preparation of iron now entirely disused in this form, but retained in the materia medica as a powder. It is the ferrum tartarizatum, or tartrit of iron.

BALLS (Mercurial), an amalgam of mercury and tin, formed by adding a quantity of mercury to an equal weight of melted tin, and pouring the fluid mass into a round and hollow mould. These balls were formerly used to purify water.

BALL-VEIN, a sort of iron ore common in Sussex, which, though it yields but a small quantity of metal, is yet wrought to great advantage, because it runs freely in the fire.

BALLS, in electricity, are two pieces of cork, or pith of elder, nicely turned in a lathe, to the size of a small pea, and suspended by fine linen threads, intended as electrometers, and of excellent use to discover small degrees of electricity, to observe the changes of it from positive to negative, and vice versa, and to estimate the force of a shock before the discharge, so that the operator shall always be able to tell very nearly before the discharge, by knowing how high he has charged his jars, what the explosion will be.

BALLS OF FIRE, in meteorology, a kind of luminous bodies generally appearing at a great

height above the earth, with a splendour surpassing that of the moon, and sometimes equalling her apparent size They generally proceed in this hemisphere from north to south with vast velocity, frequently breaking into several smaller ones, sometimes vanishing with a report, sometimes not

These luminous appearances no doubt constitute one part of the ancient prodigies, blazing stars or comets, which last they sometimes resemble in being attended with a train, but frequently they appear with a round and well defined disk The first of these of which we have any accurate account was observed by Dr Halley and some other philosophers at different places, in the year 1719 From the slight observations they could take of its course among the stars, the perpendicular height of this body was computed at about 70 miles from the surface of the earth The height of others has also been computed, and found to be various, though in general it is supposed to be beyond the limits assigned to our atmosphere, or where it loses its refractive power The most remarkable of these on record appeared on the 18th of August, 1783, about nine o clock in the evening It was seen to the northward of Shetland, and took a southerly direction for an immense space, being observed as far as the southern provinces of France, and one account says that it was seen at Rome also During its course it appears frequently to have changed its shape, sometimes appearing in the form of one ball, sometimes of two or more, sometimes with a train, sometimes without one It passed over Edinburgh nearly in the zenith, and had then the appearance of a well defined round body, extremely luminous, and of a greenish colour, the light which it diffused on the ground giving likewise a greenish cast to objects After passing the zenith, it was attended by a train of considerable length, which continually augmenting, at last obliterated the head entirely, so that it looked like a wedge, flying with the obtuse end foremost The motion was not apparently swift, by reason of its great height, though in reality it must have moved with great rapidity, on account of the vast space it travelled over in a short time In other places its appearance was very different At Greenwich we are told, that "two bright balls parallel to each other led the way, the diameter of which appeared to be about two feet, and were followed by an expulsion of eight others, not elliptical, seeming gradually to mutilate, for the last was small Between each two balls a luminous serrated body extended, and at the last a blaze issued which terminated in a point Minute particles dilated from the whole The balls were tinted first by a pure bright light, then followed a tender yellow, mixed with azure, red, green, &c ; which, with a coalition of bolder tints, and a reflexion from the other balls, gave the most beautiful rotundity and variation of colours that the human eye could be charmed with The sudden illumination of the atmosphere, and the forward and singular transition of this bright luminary, tended much to make it awful nevertheless the amazing vivid appearance of the different balls, and other rich connective parts not very easy to delineate, gave an effect equal to the rainbow in the full zenith of its glory '

Dr Blagden, in a paper on this subject in the 74th volume of the Philosophical Transactions, has not only given a particular account of this and other meteors of the kind, but added several conjectures relating to the probable causes of them But the opinion which the doctor adopts, as the most probable, is, that the fireballs are great bodies of electric matter, moving from one part of the heavens, where to our conception it is superabundant, to another where it is deficient In favour of this hypothesis he has adduced various arguments, which may be seen in the volume just referred to See farther, the articles AEROLITHS, and METEORIC STONES

Besides those we have mentioned, there are other fireballs much smaller and nearer the surface of the earth, rolling upon it, or falling upon it, exploding with violence, as is the case with those which appear in the time of thunder, and frequently produce mischievous effects One of these is mentioned by some authors as falling in a serene evening in the island of Jamaica, exploding as soon as it touched the surface of the ground, and making a considerable hole in it Another is mentioned by Dr Priestley, as rolling along the surface of the sea, then rising and striking the top-mast of a man of war, exploding, and damaging the ship In like manner we hear of an electrified cloud at Java in the East Indies, whence, without any thunder storm, there issued a vast number of fireballs, which did incredible mischief This last phenomenon points out to us the true origin of balls of this kind, viz an excessive accumulation of electricity in one part, or a violent tendency to circulate, when at the same time the place where the motion begins is at so great a distance, or meets with other obstacles of such a nature, that it cannot easily get thither Urged on, however, by the vehement pressure from behind, it is forced to leave its place, but being equally unable to displace the great quantity of the same fluid, which has no inclination to move the same way with itself, it is collected into balls, which run hither and thither, according as they meet with conductors capable of leading them, into some part of the circle This is even confirmed by an experiment related at the end of Dr Priestley's fifth volume on Air He relates, that a gentleman having charged, with a very powerful machine, a jar, which had the wire supporting the knob of a considerable length, and passed through a glass-tube, a globe of fire was seen to issue out of it This globe gradually ascended up the glass-tube till it came to the top of the knob, where it settled, turning swiftly on its axis, and appearing like a red-hot iron ball of three quarters of an inch diameter On continuing to turn the machine, it gradually descended into the jar, which it had no sooner done, than there ensued a most violent explosion and

flash, the jar being discharged and broken at the same time This experiment, however, is singular in its kind, for neither the gentleman who performed it, nor any other, has yet been able to repeat it. Single as it is, we may yet gather from it, that a fireball will be the consequence of a very violent electrification of any substance, provided at the same time that the air be in a very non-conducting state, so that the electricity may not evaporate into it as fast as it is collected, for this would produce only lucid streams and flashes, as in the common experiments with the Leyden phial and it is probably an inattention to this circumstance which has hitherto prevented the repetition of the experiment above-mentioned The case is the same in thunder storms, where an excessive accumulation of electric matter always produces fireballs, the most mischievous kind of lightning

BALLS, or BALLETS, in heraldry, make a frequent bearing in coats of arms, though never so called, but having according to their several colours several names, as besants, when the colour is or, plates when argent, hurts when azure, torteaux when gules, pomeis when vert, pellets or agresses when sable, golpes when purple, orenges when tanne, and guzes when sanguine

BALLAD, a kind of popular song, adapted to the capacity of the lower class of people, who, being highly charmed with this species of poetry, are thereby not a little influenced in the conduct of their lives It consists usually of the recital of some action, adventure, or intrigue

The French confine their ballads to stricter terms A ballad, according to Richelet, is a song consisting of three strophes, or stanzas, of eight verses each, besides a half strophe, the whole in rhime, of two, three, or four verses, with a burthen repeated at the end of each strophe, as well as of the half strophe Some have suggested that a collection of ballads is necessary to a minister, in order to learn the temper and inclinations of a people, which are here frequently uttered with great simplicity The great Cecil, chief minister to queen Elizabeth, is said to have made a most ample collection of ballads, on this account A very ingenious political writer, Mr Fletcher of Saltoun, says, that if he could but make the ballads of the nation, he would care very little who made the religion of it There is a very curious collection of old English and Scottish ballads, published in 3 vols 8vo by Dr Percy, in which, and in a dissertation prefixed to Dr Aikin s Collection of Songs, &c the curious in this way may find abundance of entertainment and information

To BA'LLAD *v n* To make or sing ballads (*Shakspeare*)

BA'LLAD-SINGER *s* One whose employment is to sing ballads in the street (*Gay*)

BALLAN See LABRUS

BALLAST any heavy matter, as stone, gravel, iron &c deposited in the hold of a ship, in order to make her sink a proper depth in the water, that she may be capable of carrying a sufficient quantity of sail without oversetting

There is often great difference in the proportion of ballast required to prepare ships of equal burden for a voyage, the quantity being always more or less according to the sharpness or flatness of the ship s bottom, which seamen call the floor The knowledge of ballasting a ship with propriety, is certainly an article that deserves the attention of the skilful mariner, for although it is known that ships in general will not carry a sufficient quantity of sail till they are laden so deep that the surface of the water will nearly glance on the extreme breadth amidships, yet there is more than this general knowledge required, since, if she has a great weight of heavy ballast, as lead, iron, &c in the bottom, it will place the centre of gravity too low in the hold, and although this will enable her to carry a great sail, she will nevertheless sail very heavily, and run the risk of being dismasted by her violent rolling

To ballast a ship, therefore, is the art of disposing those materials so that she may be duly poised, and maintain a proper equilibrium on the water, so that she may be enabled to carry a good sail, incline but little, and ply well to windward

The following table will exhibit in one view the quantity of ballast allowed to ships of different sizes

Ballast allowed to the following ships

Guns	Tonnage	Iron Tons	Single Tons
110	2290	180	370
100	2090	180	370
98	2110	160	350
90	1870	160	350
80	1620	140	300
74	1700	80	270
64	1370	70	260
50	1100	65	170
44	900	65	160
38	930	70	170
36	870	65	160
32	700	65	140
28	600	60	100
24	500	50	80
22	450	50	70
20	400	50	60
Sloop	300	50	40
Brig	160	30	15
Cutter	—	20	Seldom
Sloop	—	15	any

The iron ballast is first stored fore and aft, from bulk-head to bulk-head, then the shingle ballast is spread and levelled over the iron

Masters of vessels are obliged to declare the quantity of ballast they bear, and to unload it at certain places They are prohibited unloading their ballast in havens, roads, &c the neglect of which prohibition has ruined many excellent ports All ships and vessels taking in

ballast on the river Thames are bound to pay the corporation of the Trinity-house for every ton carried to any ship in the coal trade 1s and for every other British ship, 1s 3d For every ton carried to any foreign ship, 1s 7d The Trinity-house employ men, and regulate them, and their lighters are to be marked

BALLET, or BALET, BALETTO, a kind of dramatic poem, representing some fabulous action or subject, divided into several entries, wherein several persons appear, and recite things under the name of some deity, or other illustrious character

BALLET, (from βαλλειν, *to cast*,) is more particularly used for a kind of comic dance, consisting of a series of several airs of different kinds of movements, which together represent some subject or action

BALLIAGE, a duty paid to the city of London by aliens, for certain articles exported by them

BALLISHANNON, a large town of Donegal in Ireland, with a good haven Lat 54 33 N Lon 7 50 W

BALLISTA, a military engine in use among the ancients, somewhat like our cross bow, though much larger, and more forcible, it was used in the besieging of cities, to throw in stones, or sometimes darts and javelins The word is derived from the Greek βαλλω, *to shoot, or throw* Marcellinus describes the ballista thus, a round iron cylinder is fastened between two planks, from which reaches a hollow square beam placed cross-wise, fastened with cords, to which are added screws, at one end of this stands the engineer, who puts a wooden shaft with a big head, into the cavity of the beam, this done, two men bend the engine, by drawing some wheels when the top of the head is drawn to the utmost end of the cords the shaft is driven out

BALLISTARII, slingers in the ancient armies, or soldiers who fought with ballistæ

BALLISTIUM, in antiquity, a military song and dance used on occasions of victory The ballistea were a kind of popular ballads, composed by poets of the lower class, without much regard to the laws of metre

BALLISTIC PENDULUM, an ingenious machine invented by Mr Benjamin Robins, for ascertaining the velocity of military projectiles, and consequently the force of fired gun-powder It consists of a large block of wood, annexed to the end of a strong iron stem, having a cross steel axis at the other end, placed horizontally, about which the whole vibrates together like the pendulum of a clock The machine being at rest, a piece of ordnance is pointed straight towards the wooden block, or ball of this pendulum, and then discharged the consequence is this, the ball discharged from the gun strikes and enters the block, and causes the pendulum to vibrate more or less according to the velocity of the projectile, or the force of the blow, and by observing the extent of the vibration, the force of that blow becomes known, or the greatest velocity with which the block is moved out of its place, and consequently the velocity of the projectile itself which struck the blow and urged the pendulum

The more minute and particular description may be seen in Dr Hutton's Tracts, vol 1, where are given all the rules for using it, and for computing the velocities, with a multitude of accurate experiments performed with cannon balls, by means of which the most useful and important conclusions have been deduced in military projectiles and the nature of physics Dr H has also since that publication made many other experiments of the same kind, by discharging cannon balls at various distances from the block, from which have resulted the discovery of a complete series of the resistances of the air to balls passing through it with all degrees of velocity, from 0 up to 2000 feet in a second of time

BALLOON, or BALLON, in a general sense, signifies any spherical hollow body, of whatever matter it be composed, or for whatever purposes it be designed Thus, with chemists, balloon denotes a round short-necked vessel, used to receive what is distilled by means of fire, in architecture, a round globe on the top of a pillar, and among engineers, a kind of bomb made of pasteboard, and played off, in fire-works, either in the air or on the water, in imitation of a real bomb

Air Balloon See AEROSTATION

BALLOON, among voyagers, denotes the state barges of Siam They are a kind of brigantine, and of great swiftness

BALLOON, in the French paper trade, a quantity of paper containing 24 reams

BALLOON, BALLON, or BALLOT, in the French glass-trade, a certain quantity of glass-plates, smaller or greater according to their quality The ballon of white glass contains twenty five bundles, of six plates per bundle, but the ballon of coloured glass is only of twelve and a half bundles, and of three plates to a bundle

BALLOT s (*ballote*, French) 1 A little ball or ticket used in giving votes, being put privately into a box or urn 2 The act of voting by ballot

To BA'LLOT *v n* (*balloter*, French) To choose by ballot (*Wotton*)

BALLOTA Black horehound In botany, a genus of the class didynamia, order gymnospermia Calyx salver shaped, ten-striate, five-toothed, corol with the upper lip concave and crenate Three species

1 B nigra, with white flowers, common to the wastes of our own country

2 B lanata, with white woolly stem, and yellow corol Found in Siberia

3 B disticha with petioled serrate, downy leaves a native of India

BALLOTADES, in the manage, the leaps of a horse between two pillars, or upon a straight line, made with exactness of time, with the aids of the hands and the calves of the legs, and in such a manner that when his fore feet are in the air he shews nothing but the shoes of his hind feet without striking out In this parti-

cular, ballotades differ essentially from caprioles, for when a horse works at the latter, he yerks or strikes out his hind legs with all his might, keeping them near and even. Ballotades likewise differ from croupades, in as much as the horse when he lifts or raises his croop in performing the first of these shows his shoes, while in the latter he draws his hinder feet under him.

BALLOTATION. s. (from *ballot*.) The act of voting by ballot (*Wotton*).

BALLOTING, a method of voting at elections, &c. by means of little balls usually of different colours, by the French called ballots, which are put into a box, and the party voting gives his suffrage privately.

BALLUSTER, a small pillar used for ballustrades.

BALLUSTRADE, a series or row of ballusters, joined by a rail, serving as well for rest to the elbows as for a fence or inclosure to balconies, altars, staircases, &c. The heights of ballustrades vary according to circumstances. In apportioning the parts, it is best to divide the height into thirteen equal parts, eight of these for the height of the balluster, three for the base, and two for the cornice or rail, or perhaps into fourteen, giving eight parts to the balluster, four to the base, and two to the rail. One of these parts may be called a module, and being divided into nine minutes, may serve to determine the dimensions of the particular members.

In ballustrades, the distance between two ballusters should not exceed half the diameter of the balluster measured in its thickest part, nor be less than one third of it.

BALLYCASTLE, a town of Ireland, in the county of Antrim, situated on the east side of a bay to which it gives name, with a good pier: there is a colliery near it: thirty miles N. Antrim. Lat. 55. 12 N. Lon. 6. 0 W. Greenwich.

BALLY COTTON, a bay in St. George's Channel, on the south-west coast of Ireland, in the county of Cork, north-west of Bally Cotton island. 10 miles E. Cork harbour.

BALLY COTTON, an island, in St. George's Channel, on the south-west coast of Ireland. Lat. 51. 50 N. Lon. 7. 59 W. Greenwich.

BALLYDONEGAN, a bay on the south coast of Ireland, in the county of Cork, on the south side of the entrance into Kenmure river.

BALM. s. (*baume*, French.) 1. The sap or juice of a shrub, remarkably odoriferous (*Dryden*). 2. Any valuable or fragrant ointment (*Shakspeare*). 3. Any thing that sooths pain (*Shakspeare*).

BALM. See BAUM.

BALM OF GILEAD. See AMYRIS.

BALM OF GILEAD (False). See DRACOCEPHALON.

BALM OF GILEAD FIR. See BALSAMEA.

BALM OF MECCA. See AMYRIS.

BALM (Turkey). See AMYRIS.

To BALM. v. a. (from the noun.) 1. To anoint with balm (*Shakspeare*). 2. To sooth; to mitigate (*Shakspeare*).

BA'LMY. a. (from *balm*.) 1. Having the qualities of balm (*Milton*). 2. Producing balm (*Pope*). 3. Soothing, soft (*Dryden*). 4. Fragrant, odoriferous (*Dryden*). 5. Mitigating, assuasive (*Shakspeare*).

BALNEARII SERVI, in antiquity, servants or attendants belonging to the baths.

BALNEARIUS FUR, in antiquity, a thief who practised stealing the clothes of persons in the baths, sometimes also called fur balnearum.

BA'LNEARY. s. (*balnearium*, Latin.) A bathing room (*Brown*).

BALNEA'TION. s. (from *balneum*, Lat.) The act of bathing (*Brown*).

BA'LNEATORY. a. (*balneatorius*, Lat.) Belonging to a bath.

BALNEUM, bath, in chemistry, a contrivance to modify and regulate the heat in various chemical processes, particularly distillations, by the use of different intermedia. When the degree of heat required is below that of boiling water, a vessel containing that fluid is interposed between the fire and the substance to be acted upon, and when a superior degree of heat is necessary, sand or some other matter of a similar nature is employed.

There were formerly many kinds of balnea in use, especially among the alchemists, as ash bath, dung-bath, &c. but the three following are the only ones now retained. Their advantage is considerable, and the manner of employing them is obvious from their construction.

1. Balneum aquæ, or water bath, is of great use in the distillation of essential oils, of the aromatic part of vegetables, of the finer kinds of ardent spirits, in evaporating to dryness the solutions of vegetables employed in medicine whose virtue would be lost by any excess of heat, and in many other processes. Any vessel of water, capable of being heated to boiling, and of containing a retort, will answer this purpose, but the heat of the substance immersed in it will be something less than that of the water. If a solution of salt be used instead of water only, with a view of raising the temperature to the boiling point, or higher, the apparatus is called balneum mariæ, or rather, perhaps, balneum maris, from the use of sea-salt or brine.

2. Balneum siccum, or the vapour bath, is not at present much used in chemistry, but it is employed in various forms for culinary purposes. In this bath, the vessel to be heated is exposed to the steam of boiling water, which is enclosed in a kind of case for the purpose.

3. Balneum arenæ, sand bath, the most useful of all. The vessel to contain the sand is generally of cast iron, which being gradually heated communicates the heat to every vessel buried in the sand. The sand should be of middling fineness, that the heat may be more gradually distributed. Those distillations

which, at any part of the process, require as much as a low red heat, are usually performed in sand baths, even in manufactures in the great way.

BA'LSAM (βαλσαμον, from בעל שמן, *baal samen*, the prince of oils, Heb.) A fluid, odorous, combustible substance, that communicates a sweet taste to water, and contains a concrete acid, which may be obtained by sublimation or decoction. Chemists are not agreed as to the difference between balsam and resin.

BALSAM (Artificial). Compound medicines are thus termed which are made of a balsamic consistence and fragrance. They are generally composed of expressed or ethereal oils, resins, and other solid bodies, which give them the consistence of butter. The basis, or body of them, is expressed oil of nutmeg, and frequently wax, butter, &c. They are usually tinged with cinnabar and saffron.

BALSAM. See MOLDAVICA and IMPATIENS.

BALSAM APPLE (Male). See MOMORDICA.

BALSAM OF CANADA. See BALSAMUM CANADENSE.

BALSAM OF COPAIVA. See BALSAMUM COPAIVÆ.

BALSAM (Natural). A resin which has not yet assumed the concrete form, but still continues in a fluid state, is so called, as common turpentine, balsamum copaivæ, peruvianum, tolutanum, &c.

BALSAM (Peruvian). See BALSAMUM PERUVIANUM.

BALSAM OF TOLU. See BALSAMUM TOLUTANUM.

BALSAMEA. The balm of Gilead fir. The tree formerly so called in the pharmacopœias, is the pinus balsamea of Linnéus: it affords the Canada balsam. See BALSAMUM CANADENSE.

BALSA'MICAL. BALSA'MICK. *a.* Unctuous, mitigating, soft, mild (*Hale*).

BALSAMICS. A term generally applied to substances of a smooth and oily consistence, which possess emollient, sweet, and generally aromatic qualities.

BALSAMINE (Female). See IMPATIENS.

BALSA'MITA. In botany, a genus of the class syngenesia, order polygamia æqualis. Receptacle naked; downless; calyx imbricate. Four species: all natives of Italy and the Barbary coasts.

BALSAMITA MAS. Tanacetum hortense. Costus hortorum. Costmary or alecost. The plant which bears this name in the pharmacopœias is the tanacetum balsamita; foliis ovatis, integris serratis of Linnéus. A fragrant smelling herb, somewhat like that of mint; formerly esteemed as a corroborant, carminative, and emmenagogue.

BALSAMITA FŒMINA. See AGERATUM.

BALSAMUM AMERICANUM. See BALSAMUM PERUVIANUM.

BALSAMUM BRASILIENSE. See BALSAMUM COPAIVÆ.

BALSAMUM CANADENSE. Canada balsam. One of the purest turpentines, procured from the pinus balsamea of Linnéus, and imported from Canada. For its properties, see TURPENTINES.

BALSAMUM COPAIVÆ. Balsamum Brasiliense. Balsamum copaibæ. Balsamum de copaibu. A yellow resinous juice of a moderately agreeable smell, and a bitterish biting taste, that remains a long time in the mouth. It is obtained from the copaifera officinalis of Linnéus, class decandria, order monogynia, by making deep incisions near the base of its trunk. The juice flows so freely as to afford twelve pounds in about three hours. Balsam of copaiva, like most other balsams, is nearly allied to the turpentines, with which it is always mixed in the shops. It was formerly thought to be a very efficacious remedy. It determines very powerfully to the kidneys, and impregnates the urine with its qualities. It is given principally in gonorrhœas, phthisis pulmonalis, fluor albus, and in nephritic complaints.

BALSAMUM GILEADENSE. Balsamum de Mecca. Balsamum Meccanum. Balsamum verum. This resinous juice, obtained by making incisions into the bark of the amyris gileadensis of Linnéus (amyris foliis ternatis integerrimis, pedunculis unifloris lateralibus: class octandria, order monogynia), is of a light yellow colour, of a bitter, acrid, adstringent taste, and of a very strong smell, resembling that of lemons. The chief mark of its goodness is said to be founded on this, that when dropped on water, it spreads itself all over the surface, forming a thin pellicle, tough enough to be taken up upon the point of a pin, and, at the same time, impregnating the water with its smell and flavour. Its virtues are similar to those of the Canada and copaiva balsams. The fruit of this tree is termed carpobalsamum in the pharmacopœias; and the wood or branches, xylobalsamum. See AMYRIS.

BALSAMUM DE MECCA. See BALSAMUM GILEADENSE.

BALSAMUM INDICUM. See BALSAMUM PERUVIANUM.

BALSAMUM MECCANUM. See BALSAMUM GILEADENSE.

BALSAMUM MEXICANUM. See BALSAMUM PERUVIANUM.

BALSAMUM PERUVIANUM. Balsamum Indicum. Balsamum Mexicanum. Balsamum Americanum. Balsam of Peru. The tree which produces this resinous fluid is described by the younger Linnéus by the name of myroxylon Peruiferum: class decandria, order monogynia. Two species of this balsam are imported into this country, the common or black, and the white. The first, which is chiefly used, is about the consistence of a syrup, of a dark, opake, reddish brown colour, inclining to black, and of an agreeable aromatic smell, and a very hot pungent taste. The white balsam, called also white storax, is brought over in gourd-shells, and is of a pale

yellow colour, thick and tenacious, becoming by age solid and brittle They are esteemed as warm nervine medicines, and are sometimes used by surgeons in certain conditions of wounds and ulcers

BALSAMUM PERUVIANUM ALBUM See BALSAMUM PERUVIANUM

BALSAMUM PERUVIANUM NIGRUM See BALSAMUM PERUVIANUM

BALSAMUM RACKASIRA This balsam, which is inodorous when cold, but of a smell approaching to that of tolu balsam when heated, is brought from India in gourd shells It is slightly bitter to the taste, and adheres to the teeth on chewing It is supposed by some to be factitious It is never prescribed in this country

BALSAMUM TOLUTANUM Balsam of tolu This juice, which is considered as a true balsam by modern chemists, is of a reddish, yellow, transparent colour, in consistence thick and tenacious, by age it becomes so hard and brittle, that it may be rubbed into a powder between the finger and thumb Its smell is extremely fragrant, somewhat resembling that of citrons its taste is warm and sweetish, on being chewed it adheres to the teeth Thrown into the fire it immediately liquefies, takes flame, and disperses an agreeable odour The tree which affords this balsam, from incisions of its bark, is the tolutifera balsamum of Linneus, which grows in South America, between Carthagena and Honduras Tolu balsam possesses corroborant, stomachic, and nervine qualities It has been chiefly used as a pectoral, and is directed in the pharmacopœias in the syrupus tolutanus, tinctura tolutana, and syrupus balsamicus

BALSAMUM VERUM See BALSAMUM GILEADENSE

BALSHAM (Hugh de), or DE BEDESALE, or BELESALE, the tenth bishop of Ely, and founder of St Peter s college, otherwise Peterhouse, in Cambridge, was in all probability born at Balsham in Cambridgeshire (from whence he took his surname), towards the beginning of the thirteenth century He was at first a monk, and afterwards sub-prior of the Benedictine monastery at Ely In 1247, November 13 he was chosen, by his convent, bishop of Ely, in the room of William de Kilkenny, deceased But king Henry III who had recommended his chancellor Henry de Wengham, being extremely angry at the disobedience of the monks, refused to confirm the election, and, moreover, he felled the woods, spoiled the ponds, and otherwise wasted the manors and estates belonging to the bishopric He endeavoured at last to persuade the monks to proceed to a new election, alleging, that it was not fit so strong a place as Ely should be entrusted with a man that had scarcely ever been out of his cloister, and who was utterly unacquainted with political affairs. Balsham, finding he was not likely to succeed at home, went to Rome, in order to be confirmed by the pope, who, through the plenitude of his apostolical power, pretended to dispose of all the ecclesiastical preferments in Christendom In the mean time, Boniface archbishop of Canterbury used his utmost interest at Rome to obstruct Hugh de Balsham s confirmation, though he could allege no one fault against him, and recommended Adam de Maris, a learned Minorite friar, as a fit person to be promoted to the bishopric but all his endeavours proved unsuccessful As to Wengham, having been recommended by the king without his own desire and knowledge, he did not stir in the least to get himself elected by the monks, but rather, out of an uncommon excess of modesty, declined the honour, alleging that the two others (Balsham and Maris) were more worthy of it, and more deserving than himself This matter remained in suspence for above ten years and was at length determined in favour of Hugh de Balsham For Wengham being promoted to the bishopric of London, upon Fulk de Basset's decease, the pope confirmed Hugh de Balsham s election on the 10th of March, 1257, and he was consecrated the 14th of October following Being thus fixed in his see, he applied himself to works of charity, and particularly, in the year 1257, or 1259 according to some, put in execution what he had designed, if not begun, before, that is, he laid the foundation of St Peter s college, the first college in the university of Cambridge He built it without Trumpington gate, near the church of St Peter (since demolished), from whence it took its name He died at Dodington, June 16, 1286, and was buried in the cathedral church of Ely

BALTAGI, among the Turks, porters and hewers of wood in the court of the grand signior, who also mount on horseback when the emperor rides out

BALTHEUS ORIONIS, Orion s belt, in astronomy, three stars of the second magnitude, placed nearly in a right line in Orion

BALTIC SEA (the Mare Suevicum of the Romans) A great gulf N of Germany and Poland, from which run several other gulfs, particularly those of Bothnia, Finland, Livonia, and Dantzick This sea neither ebbs nor flows, and a constant current always sets through the Sound into the Northern Ocean Great quantities of yellow amber are found on some parts of its coast

BALTIMO'RA In botany, a genus of the class syngenesia, order polygamia necessaria Receptacle chaffy, downless, calyx cylindrical, many leaved, ray five-flowered One species only, a native of Maryland, with channelled, rough angular stem and yellow flowers

BALTIMORE, a town of Ireland, in the county of Cork, and province of Munster It is seated on a promontory Lat 51 24 N. Lon 9 14 W

BALTIMORE, a county of Maryland, in America Its chief town is of the same name, and is reckoned the fourth in size in the United States Its inhabitants amount to about 10,000 Lat 39 45 N Lon 76 25 W

BALUCLAVO, or JAMBOL, a town on the W coast of Crim Tartary, in European Turkey Lat 44 50 N Lon 34 13 E

BA'LYARDS *s* (from *ball*, and *yard*, or stick) A play at which a ball is driven by the end of a stick now corruptly called billiards (*Spenser*)

BALYUR, or BALIUR, a sea-port of Africa in the kingdom of Dancali, about fourteen hours journey west from Babel Mandel

BAM, BEAM, being initials in the name of a place, imply it to have been woody, from the Saxon beam (*Gibson*)

BAMBA, a province of the kingdom of Congo in Africa, situated between the rivers of Ambrisi and Lose, the last of which parts it from Pemba on the east, as the Ambrisi does from the province of Sogno on the north Along the sea-coasts it extends itself northward to the river Lelunda, and on the south to that of Danda, which parts it from the kingdom of Angola

BAMBARA, a kingdom of Western Africa, bounded by the Moorish kingdom of Beeroo to the north, and Masinah, a Foulah state, south of Beeroo, by the districts of Gotto, Breedoo, and Marciana, and Nigritia or Soudan to the east, by Kong to the south, and by Ludamar and Kaarta to the west According to Mr Park, this country is beautiful and highly cultivated, while the natives are very benevolent and hospitable

BAMBERG, a bishopric of Franconia, in Germany, having its capital of the same name, where a university was founded in 1585 Bamberg is 35 miles N of Nuremberg Lat 50 2 N Lon 11 7 E

BAMBERG, a town of Bohemia, on the frontiers of Moravia, 30 miles S of Glatz Lat 49 25 N Lon 16 50 E

BAMBOO HABIT, a Chinese invention, by which a person, who cannot swim, may easily keep himself above water Four bamboos, two before and two behind their bodies, are placed horizontally, and project about twenty eight inches They are crossed on each side by two others, and the whole properly secured, leaving a space for their body, it is put over their heads, and tied secure in two minutes

To BAMBO'OZLE *v a* To deceive, to impose upon a low word (*Arbuthnot*)

BAMBOO'ZLER *s.* A cheat (*Arbuthnot*)

BAMBOROUGH, a village in Northumberland, on the sea-coast, 14 miles N of Alnwick It was once a borough, and gave name to a tract called Bamboroughshire It has a castle, on a rock, inaccessible on all sides, except the south, which is said to have been built by Ida, king of the Northumbrians, about 570 This castle, with the estate, was purchased by Crew, bishop of Durham, and left to charitable uses One of the trustees, Dr. Sharp, prebendary of Durham, made this castle his residence, reserving a part for the use of himself and family, and furnishing a part of the rest for the reception and accommodation of shipwrecked mariners and a granary was filled with corn to serve the poor in the dear seasons at a low price. A constant patrole was kept the whole extent of the manor (eight miles), to succour the distressed, and by a mode of firing a cannon from the castle, the very place of misfortune could be pointed out, and directions given to the neighbouring people to assist By these means many lives of mariners have been saved, and, we trust, so benevolent a will as that of bishop Crew will never fail to produce beneficial consequences

BAMBOUK, a kingdom of Africa, in the country of Senegal It is very populous, and, on the borders of the rivers, fertile, but in other parts sandy and barren The most remarkable animals are white apes, white foxes, and the girafa, an animal rather less than an elephant, but like a camel, and of great swiftness There are mines of gold, silver, lead, tin and iron

BAMBU CANE See ARUNDO

BAMBU'SA Bamboo In botany, a genus of the class hexandria, order monogynia Scales three, covering the spikelets which are about five-flowered, calyxless, corol a two-valved glume, style bifid, seed one Two species, both natives of the Indies 1 b arundinacea 2 b verticillata

BAMF, the capital of a shire of the same name in Scotland It is seated at the mouth of the river Doverne, near which it has a harbour and some trade It is 110 miles N of Edinburgh Lat 57 35 N Lon 2 15 W The county contains 35,800 inhabitants

BAMIYAN, a city of Asia, situated in the province of Zablestan, ten days journey from Balk, and eight from Gazna

BAMPTON, a town in Oxfordshire, with a market on Monday Lat 51 46 N Lon 1 25 W

BAMPTON, a town in Devonshire, with a market on Saturday, and a chalybeate spring Lat 51 2 Lon 1 11 W

BAN *s* (*ban*, Teutonick) 1 Publick notice given of any thing (*Cowell*) 2 A curse, excommunication (*Raleigh*) 3 Interdiction (*Milton*)

To BAN *v a* (*bannen*, Dutch) To curse, to execrate (*Knolles*)

BAN, a smooth, fine muslin from the East Indies

BANANA, in botany See MUSA

BANA'RA In botany, a genus of the class icosandria, order monogynia Calyx inferior, four-cleft, petals four; berry one celled, many-seeded One species only, a native of Cayenne Size that of a shrub

BANARES, or BENARES, a handsome town of Asia, in the dominions of the Great Mogul, greatly celebrated for its sanctity, and being the university of the Indian Brahmins It is seated on the north side of the river Ganges, in lat. 26 20 N lon 82 30 E The observatory at this place is a great curiosity an interesting account of it is given by sir Robert Barker, in vol 67, Phil. Trans

BANBURY, a town of Oxfordshire, having a market on Thursday. It sends one

member to Parliament Lat 52 4 N Lon 1 11 W

BANC, or BENCA, in law, denotes a tribunal, or judgment-seat hence king's banc is the same with the court of king s bench, and common banc with that of common pleas

BANCA, an island between Sumatra and Borneo, in the East Indies, with a town and streight of the same name Lat 2 35 S Lon 106 50 E

BANCALIS, a sea-port town on the eastern coast of Sumatra, where the Dutch have a settlement Lat 1 15 N Lon 100 7 E

BANCI JUS, or the privilege of having a bench, was anciently only allowed to the king s judges, qui summam administrant justitiam Inferior courts, as courts baron, hundred courts, &c were not allowed that prerogative, and even at this day the hundred court at Freibridge in Norfolk is held under an oak at Gey-wood, and that of Woolfry in Herefordshire, under an oak near Ashton in that county, called Hundred Oak

BANCROFT (Richard), archbishop of Canterbury, in the reign of king James I was born at Farnworth, in Lancashire, in September 1544 He was made chaplain to Dr Cox, bishop of Ely, who, in 1575, gave him the rectory of Teversham in Cambridgeshire The year following, he was licensed one of the university preachers, and in 1580 was admitted batchelor of divinity September the 14th, 1584, he was instituted to the rectory of St Andrew, Holborn, at the presentation of the executors of Henry earl of Southampton In 1585 he commenced doctor in divinity, and the same year was made treasurer of St Paul s cathedral, in London The year following he became rector of Cottingham in Northamptonshire, at the presentation of sir Christopher Hatton, lord chancellor, whose chaplain he then was February the 25th, 1589, he was made a prebendary of St Paul s, in 1592, advanced to the same dignity in the collegiate church of Westminster, and, in 1594, promoted to a stall in the cathedral of Canterbury Not long before, he had distinguished his zeal for the church of England by a sermon, preached against the puritans at St Paul s Cross In 1597, Dr Bancroft, being then chaplain to the archbishop of Canterbury, Whitgift, was advanced to the see of London, in the room of Dr Richard Fletcher, and consecrated at Lambeth the 8th of May —From this time he had, in effect, the archiepiscopal power, for the archbishop, being declined in years, and unfit for business, committed the sole management of ecclesiastical affairs to bishop Bancroft Soon after his being made bishop he expended 1000 marks in the repair of his house in London In the year 1600, he, with others, was sent by queen Elizabeth to Embden to put an end to a difference between the English and Danes but the embassy had no effect This prelate interposed in the disputes between the secular priests and the Jesuits, and furnished some of the former with materials to write against their adversaries In the beginning of king James's reign, bishop Bancroft took an active part in the celebrated conference between the bishops and the presbyterian ministers and when the king required satisfaction in the three points of confirmation, absolution, and private baptism, he undertook to explain and vindicate these branches of ecclesiastical discipline, as they were exercised in the church of England In the prosecution of this conference, and with a view to its speedy termination by an act of authority, he moved the king that an ancient canon that "Schismatics are not to be heard against bishops, should be revived This and other unjust proposals were rejected by the king The same year, 1603, he was appointed one of the commissioners for regulating the affairs of the church and for perusing and suppressing books, printed in England, or brought into the realm without public authority A convocation being summoned to meet March 20, 1603 4, and archbishop Whitgift dying in the mean time, bishop Bancroft was, by the king s writ, appointed president of that assembly October 19th, 1604, he was nominated to succeed the archbishop in that high dignity, to which he was elected by the dean and chapter, November 17, and confirmed in Lambeth chapel, December 10 In 1608 he was declared chancellor of the university of Oxford, in the room of the earl of Dorset deceased In 1610, this archbishop offered to the parliament a project for the better providing a maintenance for the clergy, but without success One of our historians pretends that archbishop Bancroft set on foot the building a college near Chelsea for the reception of students, who should answer all popish and other controversial writings against the church of England This prelate died Nov 2, 1610, of the stone, in his palace of Lambeth

BAND s (*bende*, Dutch) 1 A tie, a bandage (*Shaks*) 2 A chain by which any animal is kept in restraint (*Dryden*) 3 Any means of union or connexion (*Shaks*) 4 Any thing bound round another (*Bacon*) 5 A company of persons joined together (*Tat*)

BAND, in architecture, a general name for any flat low member, or moulding, that is broad, but not very deep

BANDS OF A SADDLE in horsemanship, two flat pieces of iron, about three fingers broad, nailed upon the bows of the saddle, one on each side, to retain them in the situation that constitutes the form of the saddle Besides these two larger bands, the fore bow has a small one called the wither band, and a crescent to support the wither arch The hinder bow has likewise a small band to render it stronger

To BAND *v a* (from the noun) 1 To unite together into one body or troop 2 To bind over with a band (*Dryden*)

BANDA ISLES, a group of islands in the Eastern sea, lying to the east of the Celebes; they are so called from *Banda*, the principal of them The largest of them is not above twenty miles in length They are supposed to contain about 5000 inhabitants, though form-

erly they were much more numerous Their chief produce is nutmegs, of which they are competent to supply the want to the rest of the world The names of the islands are Banda, or Lantor, Gonapi, or Gounong-Api, Ay, or Pulo-Ay, Rhun, or Pulo-Rhun, and Resingyn Banda lies in Lat 4 50 S Lon 128 5 E

BA'NDAGE *s* (*bandage*, Fr) Something bound over another (*Addison*)

BANDAGE, in surgery See SURGERY

BA'NDBOX *s* (from *band* and *box*) A slight box used for bands, and other things of small weight (*Addison*)

BA'NDELET *s* (*bandelet*, Fr) In architecture, any little band, flat moulding, or fillet

BA'NDIT } *s* in the plural *banditti*
BANDI'TTO } (*bandito*, Italian) In a general sense, a man outlawed (*Milt Shaks*)

BANDITTI is also a denomination given to highwaymen or robbers who infest the roads in troops, especially in Italy, France, and Sicily Mr Brydone, in his tour through Sicily, informs us, that in the eastern part, called Val Demoni, from the devils that are supposed to inhabit Mount Ætna, it has ever been found altogether impracticable to extirpate the banditti, there being numberless caverns and subterraneous passages round that mountain, where no troops could possibly pursue them besides, they are known to be perfectly determined and resolute, never failing to take a dreadful revenge on all who have offended them Hence the prince of Villa Franca has considered it, not only as the safest, but likewise as the wisest and most political scheme, to become their declared patron and protector and such of them as think proper to leave their mountains and forests, though perhaps only for a time, are sure to meet with good encouragement and a certain protection in his service, where they enjoy the most unbounded confidence, which in no instance they have ever yet been found to make an improper or a dishonest use of They are clothed in the prince's livery, yellow and green with silver lace, and wear likewise a badge of their honourable order, which entitles them to universal fear and respect from the people

BA'NDOLEERS *s* (*bandouliers*, French) Small wooden cases covered with leather, each of them containing powder that is a sufficient charge for a musket

BANDON, a river of Ireland, which empties itself into the harbour of Kinsale, in the county of Cork

BANDONBRIDGE, a town of Ireland, in the county of Cork, on the river Bandon It is a borough town, and sends two members to parliament eleven miles SSW Cork, and eight NW Kinsale

BANDORA, the principal village of the island of Salset, in the East Indies It is separated from the island of Bombay by a narrow channel Lat 19 0 N Lon 72 40 E

BANDORA, an ancient musical stringed instrument, resembling a lute

BA'NDROL *s* (*banderol*, Fr) A little flag or streamer

BA'NDY *s* (from *bander*, Fr) A club turned round at bottom, for striking a ball

To BANDY *v a* 1 To beat to and fro, or from one to another (*Blackmore*) 2 To give and take reciprocally (*Shaks*) 3 To agitate, to toss about (*Locke*)

To BANDY *v n* To contend (*Hudibras*)

BA'DYLEG *s* (from *bander*, French) A crooked leg (*Swift*)

BA'NDYLEGGED *a* (from *bandyleg*) Having crooked legs (*Collier*)

BANF *s* (bana, Sax a murderer) 1 Poison (*Addison*) 2 Mischief, ruin (*Hooker*)

To BANE *v a* To poison (*Shakspeare*)

BANEBERRY, in botany See ACTÆA

BA'NEFUL *a* (from *bane* and *full*) 1. Poisonous (*Pope*) 2 Destructive (*B Jonson*)

BA'NEFULNESS *s* (from *baneful*) Poisonousness, destructiveness

BA'NEWORT *s* Deadly nightshade

To BANG *v a* (*vengolen*, Dutch) 1 To beat, to thump (*Howel*) 2 To handle roughly (*Shakspeare*)

BANG *s* A blow, a thump (*Hudibras*)

To BA'NGLE *v a* To waste by little and little (*Duty of Man*)

BANGLE-EARS, in the manage, an imperfection in horses, which may be remedied in the following manner place the ears in the situation in which you would have them stand, and then with two little boards three fingers breadth, or thereabouts, with two long strings fastened to them, bind the ears so fast in the places where they are fixed that they cannot stir Then behind the head, and at the roots of the ears, you will perceive a large quantity of wrinkled skin, which you must take up with your finger and thumb, and at the same time clip away with a sharp pair of scissars all the empty part close by the head Then with a needle and silk stitch the two outsides of the skin together, and heal it up as a common cut or wound when this is done, let the splints or pieces of boards be removed, and in a little time the ears will retain the position they were fixed in at the time of performing the operation

BANGOR, an episcopal city of Carnarvonshire, in North Wales It was formerly very large, and was defended by a strong castle, which has long been demolished On account of its extent and populousness it received the appellation of Bangor Vaur, i e Bangor the Great This bishopric is valued in the king's books at 131*l* 16*s* 3*d* It has a market on Wednesday, and is 251 miles NW by W of London Lat 53 12 N Lon 4 12 W

BANGOR, a borough town of the county of Down, Ireland Lat 54 40 N Lon 5 42 W

BANGUE, an Indian name for a plant not yet classified, whose stalks resemble those of hemp Its seeds and leaves are heating, and strangely affect the imagination Aphrodisiac qualities are also attributed to them.

BANIANS, a religious sect in the empire

of the Mogul, who believe a metempsychosis; and will therefore eat no living creature, nor kill even noxious animals, but endeavour to release them when in the hands of others. The name of Banian is used with some diversity, which has occasioned much confusion, and many mistakes Sometimes it is taken in a less proper sense, and extended to all the idolaters of India, as contradistinguished from the Mahometans in which sense, Banians include the Bramin and other casts Banians, in a more proper sense, are restrained to a peculiar cast, or tribe, of Indians, whose office or profession is trade and merchandize, in which sense, Banians stand contradistinguished from Bramins, Cuttery, and Wyse, the three other casts into which the Indians are divided The four casts are absolutely separate as to occupation, relation, marriage, &c though all of the same religion, which is more properly denominated the religion of the Bramins, who make the ecclesiastical tribe, than of the Banians, who make the mercantile The proper Banians are called, in the Shaster, or book of their law, by the name of Shuddery, under which are comprehended all who live after the manner of merchants, or that deal and transact for others, as brokers, exclusive of the mechanics, or artificers, who make another cast, called Wyse

The Banians are the great factors, by whom most of the trade of India is managed, being in this respect equal to the Jews and Armenians, and not inferior to either in skill and experience, in whatever relates to commerce Nothing is bought but by their mediation They seem to claim a kind of *jus divinum* to the administration of the traffic of the nation, grounded on their sacred books, as the Bramins do to that of religion They are dispersed for this purpose through all parts of Asia, and abound in Persia, particularly at Ispahan and Gombroon, where many of them are extremely rich, yet not above acting as brokers, where a penny is to be got

BANIAN DAYS, a cant term among sailors, to signify those days in which they have no flesh meat.

Banian tree See Ficus

BANJAR, a river of the island of Borneo, in the East Indies, in the mouth of which (twice as broad as the Thames at Gravesend) is a floating town, where the English East India Company have a factory

BANILLA, in botany See Vanilla and Vanilloe

To BA'NISH. *v a* (*banir*, French.) 1 To condemn to leave his own country (*Shaks*) 2 To drive away (*Tillotson*)

BA'NISHER *s* (from *banish*) He that forces another from his own country (*Shaks*)

BA'NISHMENT *s.* (*banissement*, Fr) 1 The act of banishing another 2 The state of being banished, exile (*Dryden*)

Banishment, exile, among us, is of two kinds the one voluntary, and upon oath, the other by compulsion, for some offence or crime. The former, properly called *abjuration*, is now ceased, the latter is chiefly enjoined by judgment of parliament Yet outlawing and transportation may also be considered as a species of exile. By Magna Charta, none shall be outlawed or banished his country but by lawful judgment of his peers, or according to the law of the land 9 Hen. III c. 29. And by the common law, no person shall be banished but by authority of parliament, or in case of abjuration for felony, &c But this is taken away by statute, 3 inst 115 stat. 21 Jac I. c 28

BANISTERIA, in botany, a genus of the class decandria, order trigynia Calyx five-parted, with two melliferous pores at the base of each division, on the outside, petals roundish, with claws, filaments cohering at the base, capsules three, one-seeded, simply winged at the top Twenty-three species, almost all natives of the West Indies or America

BANK, in commerce, is a denomination given to certain societies, or communities, who take on them the charge of the money of private persons, to keep it secure, and pay whensoever demanded The word *bank*, in this sense, comes from the Italian *banca*, formed of the word *banco*, a bench, whereon the ancient money-changers sat in the public markets, or, as others think, a table whereon they told their money, for the term *banco* signifies a table, as well as a bench, as among the Greeks, the word τραπεζα signified a bench, as well as a table; whence the word τραπεζιτης for a bencher

It cannot be doubted that the beginning of traffic was by exchanging one commodity for another, as men could best suit each others occasions But the necessities of men being so various and different, in respect to the quantity and quality of requisites, money was instituted as the most convenient medium for commerce, whereby people might procure whatsoever they stood in need of in quantities according to their exigencies. Yet this way of payment is attended with many inconveniences, as the trouble in counting the money, hazard in securing it from the attempts of robbers, and loss from trusting it with unfaithful servants for the prevention of all which, cities of large commerce have very naturally introduced the use of banks A bank then may be properly defined a common repository, where many persons agree to keep their cash, to be always ready at their call or direction The first institution of banks was in Italy, where the Lombard Jews kept benches in the market-places for the exchange of money and bills; and *banco* being the Italian name for bench, banks took their title from this word.

There are two principal kinds of banks, either public, consisting of a society of monied men, who, being duly incorporated according to law, agree to deposit a considerable fund, or joint stock, to be employed for their use, by lending money upon good security, buying and selling bullion, discounting bills of exchange, &c.; or private, which are established by individuals, or co-partners, who deal as the

same way as the former, upon their own stock and credit.

The bank of Venice was established about the year 1157, the bank of Genoa in 1345, the bank of Amsterdam in 1609, the bank of Hamburgh in 1619, the bank of Rotterdam in 1635, the bank of England in 1694, the bank of Scotland in 1695, the bank of France in 1716.

Bank of England was projected by Mr. W. Paterson, a merchant, who in conjunction with others arranged the establishment, for which with some difficulty they obtained the sanction of parliament. The charter was executed July 27, 1694, and was granted for the term of twelve years, the corporation being then determinable on a year's notice. The original capital subscribed was 1,200,000*l*. which they lent to government at 8 per cent. interest, with an allowance of 4000*l* per annum for their expenses of management.

In less than two years from its establishment the company was involved in much difficulty from the bad state of the silver coin, and the great discount to which all public securities had fallen: the impossibility of getting a sufficient supply of cash during the re-coinage reduced them to the necessity of paying their notes by small instalments, and of issuing bonds, bearing interest, in exchange for their cash notes. These difficulties, however, were overcome by prudent management, and the responsibility and reputation of the bank became fully established. The term of the charter was, in 1706, extended to five years beyond the original period, in consideration of the company having undertaken to circulate for government exchequer bills to the amount of 1,500,000*l* and it has since been further extended at different times, viz.

In 1709 to 1st of August	1732
1713	1742
1742	1764
1763	1786
1781	1812
1800	1833

On all these occasions the company have either paid a considerable sum, or advanced a greater amount by way of loan to government, as a consideration for the renewal of their exclusive privileges, and for the advantages they derive from acting as the agents for government in all money transactions of any importance. Their chief privilege consists in the prohibition of all other companies or partnerships of more than six persons from issuing bills or notes payable on demand, or for any time less than six months.

The total permanent debt due from government to the bank is 11,686,800*l* bearing 3 per cent. interest; but the capital stock of the company is 11,6[illegible],400*l* on which they pay a [illegible] of 10 per cent. per annum to the [illegible].

The notes of the bank of England are the [illegible] of money in all the commercial [illegible] of London and its vicinity, and from the vast magnitude of the payments in which they are employed, the total amount in circulation, which till within a few years was never made public, was generally thought to be much greater than it has since appeared to have been. The total amount of bank notes in circulation on the 25th of February, 1787, was 8,688,570*l* which on the 25th of February, 1793, had increased to 11,451,180*l*. Soon after this period the temporary annual advances which the bank had long been accustomed to make to government were increased; while an advance in the price of gold, in consequence of the great exportation of coin and bullion to Germany and Ireland, greatly reduced the quantity in the hands of the bank, and consequently rendered it impracticable to maintain the same amount of notes in circulation. An alarm of invasion in the beginning of the year 1797 greatly increased the demands on the bank for cash, and it was deemed necessary for the government to interfere and authorise a suspension of payment in cash for bank notes, for a limited period.* The continuance of the suspension was at first renewed annually, and afterwards till the return of peace. In order to supply a substitute for coin for making small payments, the bank issued notes of 2*l* and 1*l* each, and as the demand for notes of this description has increased, the total amount of bank notes in circulation has become considerably greater than previous to the suspension of issuing cash, viz.

On the 1st of Feb.	1805,	£18,397,880
	1806,	17,293,570
	1807,	16,621,390

From the reports of the secret committee appointed in 1797 to investigate the affairs of the bank, it appeared that on the 25th of February, in that year, there was a balance of 3,826,903*l* and on the 11th of November a balance of 3,839,550*l*. in favour of the company, their profits since must have been greater than while they were obliged to maintain a large stock of cash to answer their notes, which has enabled them to make several occasional dividends to their proprietors, and at Lady-day, 1807, to raise their usual dividend from 7 per cent. which it had been for the last nineteen years, to 10 per cent.

The profits of the company arise from the interest received from government on the permanent debt, and on their annual advances on exchequer bills and treasury bills of exchange, from their allowance for receiving the contributions to loans, and for paying the dividends on the public funds; from dealing in bullion,

* By the report of the committees of lords and commons, it appears that the court of directors, between the 14th of January, 1795, and the 24th of February, 1797, had made *nine-and-twenty* representations to the chancellor of the exchequer, stating the inconvenience which the bank suffered, and the evil consequences which were likely to ensue from the large amount of the advances to government.

and discounting mercantile bills of exchange, and other sources of less importance

The concern is under the management of a governor, deputy governor, and twenty-four directors, who are elected annually. 500*l* bank stock entitles the proprietor to a vote at the general courts, and no proprietor is entitled to more than one vote for any sum whatever (*British Encyclo*)

BANK OF SCOTLAND was established under the superintendance of Mr W Paterson, from whom the plan of the bank of England originated It was erected by an act of the parliament of Scotland in 1695, and although its capital stock was only 1,200,000*l*. Scots, or 100,000*l* sterling, it was soon found very beneficial to the commerce of North Britain In 1774 they were authorised to increase their capital 1,200,000*l* Scots, or 100,000*l*. sterling, and in 1784 another addition was made of the same amount. By an act passed in 1792, they were impowered to double the existing capital, which thus became equal to 600,000*l* sterling, and in 1794 a further addition was made equal to 400,000*l* sterling, the total capital thus became 12,000,000*l* Scots, or 1,000,000*l* sterling The company is under the management of a governor, a deputy governor, twelve ordinary directors, and twelve extraordinary directors (*British Encyclo*)

BANK ROYAL OF SCOTLAND was established by charter in 1727, with a capital of 151,000*l* sterling The public revenues of Scotland are paid into this bank, and it is under the management of a governor, deputy governor, and sixteen directors

BANK OF IRELAND was established in the year 1781 The original capital was only 600,000*l* and the company's privileges were determinable on twelve month's notice after the 1st of January, 1794. Previous to this period the capital was increased to 1,000,000*l* and the term extended to the 1st of January, 1816, and by a subsequent act they were impowered to augment their capital to 1,500,000*l* In the original act by which this bank was established, it was directed that they should not borrow or give security by bill, bond, note, covenant, or agreement, under their common seal or otherwise, for any sum exceeding their capital, and a clause to a similar purport, though not in the same precise words, was included in the subsequent acts Since the suspension of payment in cash, however, the total amount of the notes of the bank of Ireland in circulation has been greatly increased, so that on the 1st of January, 1797, they amounted only to 621,917*l* 6*s* 4*d*. including bank post bills, whereas on the 1st of February, 1806, the amount of their notes of 5*l* value and upwards was 1,676,118*l* 11*s* 2½*d*., and of notes under 5*l* value 811,454*l* 10*s* 9*d* making together 2,487,573*l*. 1*s*. 11½*d*.

The bank receives interest at 5 per cent. from the government, on their permanent and temporary loans, and an allowance for management of such part of the public debt as has been made transferable at the bank of Ireland (*British Encyclo.*)

BANK OF AMERICA was established by authority of Congress at Philadelphia, in the year 1791 The act of incorporation passed February 25th in that year Its capital, or joint stock, amounts to ten millions of dollars, at 4*s* 6*d*, or 2,250,000*l*. sterling It is divided into 25,000 shares of four hundred dollars, or 90*l* sterling each share, certificates for which are issued by order and under the seal of the president, directors, and company of the said bank which certificates entitle the holders of them to such dividends as shall be declared half-yearly, by the said president and directors, on the first day of January, and the first day of July, in each year The above capital consists of six millions of the six per cent. fund, which has been subscribed into it, and four millions of dollars in specie By a resolution of the president and directors of this bank, which passed on the first day of February, 1793, it was determined that the dividends upon this stock might be received in London, or Amsterdam, without deduction, on the proprietors signing a requisition for that purpose, forms of which may be seen and had at the offices of Messrs Robson and Gill, brokers for the purchase and sale of American funds, No 22, 'Change-alley, and No 2, Castle-alley, Royal Exchange

BANK (Million), derives its name from king William's *million* lottery in the year 1695; the proprietors agreed in partnership to purchase tickets in this lottery They afterwards purchased many reversions of the 14 per cent. annuities, and admitted many proprietors of annuities to purchase their joint stock, which amounted, and still amounts, to 500,000*l*. They are a partnership by deed enrolled in chancery, in the year 1721 They divided 5 per cent till Lady-day, 1728, when they reduced their annual dividend to 4 per cent and it was again raised to 5 per cent, which is still continued

PRIVATE BANKS have within these thirty years been formed in almost every considerable town in Great Britain, their purchases and payments of all kinds are made by notes, and thus the country business is in a great degree carried on by paper currency It is almost generally believed, that the community at large has derived considerable benefit from this artificial method of increasing the circulating medium: a proposition, the truth or fallacy of which it would not be easy to demonstrate. Some persons, however, are of opinion, on the contrary, that the late multiplication of banking companies, in all parts of the united kingdom, is a measure fraught with evil; but most commercial men say, that instead of diminishing it increases the security of the public. It obliges all of them to be more circumspect in their conduct, and, by not extending their currency beyond its due proportion to their cash, to guard themselves against those malicious runs which the rivalship of so many competi-

tors is always ready to bring upon them. It restrains the circulation of each particular company within a narrower circle, and reduces their circulating notes to a smaller number. By dividing the whole circulation into a greater number of parts, the failure of any one company, an accident which, in the course of things, must sometimes happen, becomes of less consequence to the public. This free competition too obliges all bankers to be more liberal in their dealings with their customers, lest their rivals should carry them away. In general, if any branch of trade, or any division of labour, be advantageous to the public, the freer and more general the competition that prevails the better.

There is another kind of banks, instituted wholly upon the public account, and called *banks of deposit*, their nature is not generally understood, but their object is to reform the currency which may at any time be worn, clipped, or otherwise reduced below its standard value. Such were the banks of Venice, Genoa, Amsterdam, Hamburgh, &c when originally established, the last in particular being always obliged to pay in good money, according to the standard of the state. As the cash of such banks was more valuable than the common currency of the country, it necessarily bore an *agio*, or an additional per centage, in proportion as the currency was supposed to be more or less depreciated. Thus the *agio* of the bank of Hamburgh, which is said to vary from fourteen to twenty per cent, constitutes the supposed difference between the standard money of the state and the clipt, worn, and debased currency poured in from the neighbouring countries.

The reader may advantageously consult Thoughts on the Nature of Paper Credit, by H. Thornton, esq, M P.

BANK, in natural history, denotes an elevation of the ground, or bottom of the sea, so as sometimes to surmount the surface of the water, or, at least, to leave the water so shallow, as usually not to allow a vessel to remain afloat over it. In this sense, bank amounts to much the same with flat, shoal, &c. There are banks of sand, and others of stone, called also shelves or rocks. In the North sea, they also speak of banks of ice, which are large pieces of that substance floating about. The bank absolutely so called denotes the great bank of Newfoundland, the scene of the cod fishery.

Banks are usually distinguished by a buoy, post, or the like. On charts, sand-banks are usually marked by little dots, and banks of stone by crosses. The colour of the buoys are also varied accordingly, sand-banks being ... by light-coloured buoys, and rocks by ... rge rivers, as the Elbe, &c. ... gh tides and inundations, are ... lace, care is therefore taken ... from time to time, to show ... f the river. An exact knowledge ... their extent, and the depth ... the most essential part ... a master of a ship.

BANK also denotes an elevation of earth, stones, or other materials, in form of a wall sloped on both sides, to stop the waters, and prevent inundations. It likewise denotes a seat, or bench, of rowers.

To BANK. *v. a.* (from the noun.) 1. To enclose with banks. 2. To lay money in the hands of a banker.

BANKAFALET, a game at cards, a pack of which being cut into as many heaps as there are players, every man lays as much money on his own card as he pleases; and the dealer wins or loses as many as his card is superior or inferior to those of the other gamesters. The best card is the ace of diamonds, the next to it the ace of hearts, then the ace of clubs, and, lastly, the ace of spades, and so of the rest of these suits in order, according to their degree. The cheat lies in securing an ace, or any other sure winning card, which are somehow marked, that the sharper may know them.

BANK-BILL. *s.* (from *bank* and *bill*.) A note for money laid up in a bank, at the sight of which the money is paid. (*Swift*.)

BA'NKER. *s.* (from *bank*.) One that trafficks in money.—A list of the bankers in London is given annually in Kearsley Gentleman's Pocket Ledger, Johnson's Pocket Journal, and other similar publications.

BANKER, in bricklaying, a piece of timber on which bricks are cut.

BANKING, the making of banks to oppose the force of the sea, rivers, or the like, and secure the land from being overflowed or wasted. With respect to the water which is to be kept out, this is called banking, with respect to the land, which is hereby to be defended, embanking.

BANKING is also applied to the keeping a bank, or the employment of a banker. Banking, in this sense, signifies the trading in money, or remitting it from place to place by means of bills of exchange. This answers to what the French call *faire la banque*.

BANKRUPT, a dealer, who having gotten other men's goods, or money, in his hands, absconds to defraud his creditors, or being so reduced and involved that he can conduct his business no longer, is desirous of being legally discharged from farther demands and trouble. The word is formed of the ancient Latin *bancus*, a *bench*, or *table*, and *ruptus*, *broken*.

The present system of bankrupt laws is calculated for the benefit of commerce, and founded on the principles of humanity and justice. Hence they confer some privileges not only on the creditors, but also on the bankrupt or debtor himself, for, by taking into consideration the sudden and unavoidable accidents to which a person engaged in trade is liable, they not only grant personal liberty, but likewise pecuniary assistance, to men in this unfortunate situation; on condition that they surrender their whole estate, to be divided among their creditors. The benefit of the bankrupt laws, however, are allowed to none but actual traders, as these are in general the only persons

subject to accidental losses, and to an inability of discharging their debts without any fault of their own But, when other individuals contract debts, the law renders them subject to the consequences of their own indiscretion

In the last edition of Jacob's Law Dictionary there is a table stating who may, or who may not, be bankrupts, which we copy, referring to that work for the authorities and other particulars Alehouse-keepers may not Alum-manufacturers, not Artificers, labourers, &c not Bankers, may Bakers, brewers, brokers, brick-makers, butchers, and carpenters, may Clergymen trading, clothiers, and coal-dealers, may Companies, or corporations, proprietors of shares in, generally, not; except, perhaps, in the stationers' company Contractors, public, and such other public officers, not Drovers of cattle, not Dyers, and factors, may Farmer, not, but as a potatoe-merchant he may Funds public, dealers in, not Goldsmith, may Graziers, not Inn-keepers, not Iron manufacturers, may Labourers, and land-jobbers, not Members of parliament, millers, milliners, nailors, pawnbrokers, and plumbers, may Receiver-general of taxes, not Salesmen, and scriveners, may Ship-owner, not, freighter, may Shoemakers, and smugglers, may Stock-jobbers, not Tanners, may Taylors, working, not Victuallers, not Vintners, being wine-merchants, may

By the statutes of this country, a man makes himself a bankrupt in consequence of the following acts —1 By departing from the realm, with intent to defraud his creditors, 2 By leaving his house with intent to secrete himself for the same purpose, 3 Remaining in his house so as not to be accessible to his creditors, 4 Procuring or suffering himself willingly to be arrested, outlawed, or imprisoned, without a just and lawful reason, 5 Causing his money or effects to be sequestrated by any legal process, 6 Making any fraudulent conveyance to a friend, which is an act of the same suspicious nature as the last, 7 Procuring any protection to screen his person from arrests, though not entitled to that privilege by an act of parliament, 8 Endeavouring, by any petition to the king, or by a bill against any creditors, to compel them to take less than their just debts, or to procrastinate the time of payment, 9 Lying in prison for more than two months upon arrest, or other detention for debt, without finding bail, 10. Escaping from prison after an arrest for a just debt of one hundred pounds and upwards, 11. Neglecting to make satisfaction for any just debt to the amount of one hundred pounds, within two months after service of legal process for such debt, upon any trader enjoying the privilege of parliament

Sir John Holt maintained, that a man's removing his goods privately, to prevent their being seized in execution, was no act of bankruptcy; as the statutes mention only fraudulent gifts to third persons, and causing them to be seized by sham-process, in order to defraud creditors. It has also been expressly determined, that a banker's stopping or refusing payment is not an act of bankruptcy; because there may be good reasons for such conduct, as a suspicion of forgery, &c If, in consequence of such refusal, he is arrested, and puts in bail, it is still no act of bankruptcy, but, if he goes to prison, and remains there two months, then, and not before, he becomes a bankrupt

The consequences resulting from the unfortunate situation of a bankrupt, will be concisely stated under the article COMMISSION OF BANKRUPTCY

To BA'NKRUPT *v a.* To break; to disable one from satisfying his creditors (*Hamm.*)

BA'NKRUPTCY *s* (from *bankrupt*) 1 The state of a man broken, or bankrupt 2 The act of declaring one's self bankrupt.

BANKS'S ISLAND, an island in the Southern Pacific Ocean, the surface of which appears elevated, irregular, and broken: it is about twenty-four leagues in circumference, and inhabited Lon 286 30 W Greenwich. Lat 43 32 S

BANKS'S ISLAND, an island in the North Pacific Ocean, near the west coast of North America about sixty miles long, and five broad Lon 129 45 to 130 10 W Greenwich Lat 53 30 N

BA'NKSIA, in botany, a genus of the class tetrandria, order monogynia Receptacle common, elongated, scaly, corol four-petalled, stamens inserted on the border; capsule one or two-valved, two-seeded, with a moveable partition between the seeds, seeds winged. The name given in honour of sir Joseph Banks, bart Nine species some with a two-celled capsule and aggregate flowers, others with a one-celled capsule and solitary flowers. They are all natives of New Holland

BANN, or BAN, BANNUM, or BANNUS, in the feudal law, a solemn proclamation, or publication of any thing The origin of the word is uncertain, some deduce it from the British *ban*, clamour, noise, others from the Saxon pan, a thing spread, whence *ban*, and band, used for a flag

Bracton mentions *bannus regis*, for a proclamation of silence anciently made by the court, before the encounter of the champions in a combat.

BANN is also used for a solemn convocation of the nobility of a province, to attend the king in his army, conformably to their several tenures

BANN also denotes a pecuniary mulct, or penalty, laid on a delinquent for offending against a bann

BANNS OF MARRIAGE are certain solemn notices of matrimonial contracts made in the parish church before the marriage, that if there be any objections to either party as to prior engagements, &c there may be an opportunity of making them The publication of banns (popularly called *asking in the church*) was intended as an expedient to prevent clandestine marriages but a licence or dispensation is now easily procured, so that their use is defeated

The use of matrimonial banns is said to have

been first introduced into the Gallican church, though something like it obtained even in the primitive times, and it is this that Tertullian is supposed to mean by *trinundina promulgatio* The council of Lateran first extended, and made the usage general. By the ordinance of Blois, no person could validly contract marriage, without a preceding proclamation of three banns; nor could this in any case be dispensed with, except for the two last But the French, even before their revolution, abated of this severity, and minors only were under an absolute necessity of submitting to the formality of banns. For majors, or those of age, after publication of the first banns, the two latter were easily bought off

BANN is also used to denote proscription or banishment for a crime proved, because anciently published by sound of trumpet, or, as Vossius thinks, because those who did not appear at the abovementioned summons were punished by proscription. Hence, *to put a prince under the bann of the empire*, is to declare him divested of all his dignities

BANN, in military affairs, a proclamation made in the army by beat of drum, sound of trumpet, &c requiring the strict observance of discipline, either for the declaring a new officer, or punishing an offender

BANNALIS MOLA, or BANNAL-MILL, a kind of feudal service, whereby the tenants of a certain district are obliged to carry their corn to be ground at a certain mill, and to be baked at a certain oven, for the benefit of the lord.

BANNER denotes either a square flag, or the principal standard belonging to a prince We find a multiplicity of opinions concerning the etymology of the word banner, some deriving it from the Latin *bandum*, a band or flag; others from the word bann, to summons the vassals to appear in arms, others again from the German *ban*, a field or tenement, because landed men alone were allowed a banner: and, finally, there are some who think it is a corruption of *pannere*, from *pannus*, cloth, because banners were originally made of cloth.

BANNER, or Standard (*vexillum*), In botany, the upper petal of a papilionaceous corolla.

BANNERETS, an ancient order of knights, or feudal lords, who, possessing several large fees, led their vassals to battle, under their own flag or banner, when summoned thereto by the king.

Anciently there were two kinds of knights, great and little; the first of these were called bannerets, the second bachelors; the first composed the upper, the second the middle, nobility. [illegible] banneret was a dignity, which [illegible] the [illegible] or to march under his own [illegible] bachelors [illegible] followed [illegible] To be qualified for a banneret [illegible] was required to be a gentleman [illegible] and possessed of power to raise [illegible] number of armed men, with estate [illegible] subsist at least 28 or 30 soldiers This must have been very considerable in those days, because each man, besides his servant, had two horsemen to wait on him, armed, the one with a cross-bow, the other with a bow and hatchet.

The form of the banneret's creation was this On a day of battle, the candidate presented his flag to the king or general, who, cutting off the train or skirt thereof, and making it a square, returned it again, the proper banner of bannerets, who are hence sometimes called knights of the square flag There seem to have been bannerets created either in a different manner, or by others than the sovereign, since king James, in the patent of baronets, gives them precedence to all knights bannerets, except such as are created by the king himself in the field; which implies, either that there are some of this order created out of the field, or by inferior persons

BANNERET is also the name of an officer or magistrate of Rome towards the close of the 14th century

BA'NNEROL *s* (from *banderole*, Fr) A little flag or streamer (*Camden*)

BA'NNIAN *s* A man's undress, or morning gown

BA'NNOCK *s* A kind of oaten or peasmeal cake

BANNOW, a once respectable borough town of Ireland, in the county of Wexford, situated at the entrance of the river Bannow Lat. 52 12 N Long 6 50 W This spot now scarcely exhibits any thing but

———————" a desert salt and bare,
The haunts of seals, and ores, and sea-mews' clang" *Milton*

Vestiges of ruins are now traced with difficulty amid heaps of barren sand The only remains of Bannow which were visible in 1786 were the walls of its church There is not on or near the site of the town more than one solitary hut The election for the representatives of the town has of late years been held on the walls of an old chimney adjoining to the church, which tumbled down piece-meal, and forms the council-table of that ancient and loyal corporation Mem Irish Academy, vol vi

BA'NQUET *s* (*banquet*, Fr) A feast (*Job*.)

To BA'NQUET *v a* To treat any one with feasts (*Hayward*)

To BA'NQUET *v n* To feast; to fare daintily (*South*)

BANQUET, or BANQUETTE, in fortification, a little foot-bank, or elevation of earth, forming a path, which runs along the inside of a parapet, upon which the musketeers get up in order to discover the counterscarp, or to fire upon the enemy in the moat, or in the coverte way

BANQUET In horsemanship, the small part of the branch of a bridle under the eye, which, being rounded like a small rod, gathers and joins the extremities of the bit to the branch, in such a manner that the banquet is

not seen, but covered by the cap, or the part of the bit next the branch.

BANQUET-LINE, in horsemanship, is an imaginary line drawn by the bit-makers, along the banquet, in forging a bit, and prolonged upwards and downwards to adjust the designed force or weakness of the branch, in order to make it stiff or easy For the branch will be hard and strong if the sevil hole be on the outside of the banquets, with respect to the neck and it will be weak and easy if the sevil hole be on the inside of the line, taking the centre from the neck See the articles BRANCH and SHOULDER

BANQUETING-ROOM, anciently the room in which the guests partook of the banquet Several of the Romans had very elegant rooms for this purpose, but they were all outdone by Nero, in his banqueting-room, called *domus aurea*, which, by the circular motion of its partitions and ceilings, imitated the revolution of the heavens, and represented the different seasons of the year, which changed at every service, and showered down flowers, essences, and perfumes on the guests

BANSTICKLE, in ichthyology See GASTEROSTEUS

BANTAM, in geography, the capital of a kingdom of the same name in the island of Java, is in lat 6 20 N lon 105 26 E This was once a place of considerable consequence, being the great mart for pepper and other spices, whence they were distributed to the rest of the world The chief factory of the English as well as Dutch East India Company was settled there The merchants of Arabia and Hindostan resorted to it Its sovereigns were so desirous of encouraging trade, by giving security to foreign merchants against the violent and revengeful disposition of the natives, that the crime of murder was never pardoned when committed against a stranger, but might be commuted by a foreigner for a fine to the relations of the deceased This place flourished for a considerable time, but the Dutch having conquered the neighbouring province of Jacatra, where they since have built Batavia, and transferred their principal business to it, and the English having removed to Hindostan and China, and trade in other respects having taken a new course, Bantam was reduced to a poor remnant of its former opulence and importance Other circumstances have accelerated its decline The bay is so choked up with daily accessions of new earth washed down from the mountains, as well as by coral shoals extending a considerable way to the eastward, that it is inaccessible at present to vessels of burden, even the party who went there from the Lion, the ship which carried lord Macartney to China, was obliged to remove from her pinnace into a canoe, in order to reach the town With the trade of Bantam the power of its sovereign declined In his wars with other princes of Java he called in the assistance of the Dutch, and from that period he became in fact their captive. To complete the ruin of Bantam, a fire some time ago destroyed most of the houses, and few have been since rebuilt

BANTAM COCK See PHASIANUS.

BANTAM WORK, a kind of Indian painting and carving on wood, resembling Japan work, only decorated with a great variety of gaudy colours Bantam work is of less value among the connoisseurs, though sometimes preferred by the unskilful to the true Japan work Formerly it was in more use and esteem than at present, and the imitation of it much practised by our japanners There are two sorts of Bantam as well as of Japan work, as in the latter some are flat, lying even with the black, and others high and embossed, so in Bantam work some are flat and others in-cut, or carved into the wood, as we find in many large screens with this difference, that the Japan artists work chiefly in gold and other metals, and those of Bantam generally in colours, with a small sprinkling of gold here and there for the flat Bantam work is done in colours, mixed with gum water, proper for the thing designed to be imitated.

To BA'NTER *v a* (*badiner*, Fr.) To play upon, to rally to ridicule (*L'Estrange*)

BA'NTER *s* (from the verb) Ridicule, raillery (*L Estrange*)

BA'NTERER *s* (from *banter*) One that banters (*L Estrange*)

BA'NTLING *s* (*bairnling*) A little child (*Pr*)

BANTRY, a town of the county of Cork, in Ireland, situated on a bay of the same name. Lat 51 36 N Lon 9 25 W

BAPHL, a word used by the ancients to express that fine red colour with which they used to illuminate the capital letters in MSS at the beginning of chapters

BAPTÆ, in antiquity, an effeminate, voluptuous kind of priests at Athens, belonging to the goddess Cotyttus, thus called from their stated dippings and washings by way of purification

BAPTISM, in matters of religion, the ceremony of washing, or a sacrament, by which a person is initiated into the Christian church. The word is formed from the Greek βαπτιζω, of βαπτω *to dip* or *wash*; but baptism is known, in ecclesiatical writers, by various other names and titles Many learned authors have supposed that baptism had its origin from the Jewish church, in which, as they maintain, it was the practice long before Christ's time to baptize proselytes or converts to their faith, as part of the ceremony of their admission, a practice which, according to some, obtains among them to this day a person turning Jew is first circumcised, and, when healed, is bathed or baptized in water, in presence of their rabbins, after which he is reputed a good Jew Others, however, insist that the Jewish proselyte baptism is not by far so ancient, and that John the Baptist was the first administrator of baptism among the Jews.

The learned Grotius is of opinion, that the rite of baptism had its origin from the time of the deluge; immediately after which, he

thinks, it was instituted in memory of the world having been purged by water. Some learned men think it was added to circumcision, soon after the Samaritan schism, as a mark of distinction to the orthodox Jews. Spencer, who is fond of deriving the rites of the Jewish religion from the ceremonies of the Pagans, lays it down as a probable supposition, that the Jews received the baptism of proselytes from the neighbouring nations, who were wont to prepare candidates for the more sacred functions of their religion by a solemn ablution, that, by this affinity of sacred rites, they might draw the Gentiles to embrace their religion, and that the proselytes (in gaining of whom they were extremely diligent) might the more easily comply with the transition from Gentilism to Judaism. In confirmation of this opinion he observes, first, that there is no divine precept for the baptism of proselytes, God having enjoined only the rite of circumcision for the admission of strangers into the Jewish religion. Secondly, that, among foreign nations, the Egyptians, Persians, Greeks, Romans, and others, it was customary that those who were to be initiated into their mysteries, or sacred rites, should be first purified by dipping their whole body in water. That learned writer adds, as a farther confirmation of his opinion, that the cup of blessing likewise, added to the paschal supper, seems plainly to have been derived from a pagan original for the Greeks, at their feasts, had one cup, called ποτηριον αγαθου δαιμονος, *the cup of the good dæmon or god*, which they drank at the conclusion of their entertainment, when the table was removed. Since, then, a rite of Gentile origin was added to one of the Jewish sacraments, viz. the passover, there can be no absurdity in supposing, that baptism, which was added to the other sacrament, namely circumcision, might be derived from the same source. In the last place, he observes, that Christ, in the institution of his sacraments, paid a peculiar regard to those rites which were borrowed from the Gentiles: for, rejecting circumcision and the paschal supper, he adopted into his re[illegible] baptism and the sacred cup, thus pre[illegible] the way for the conversion and reception of the Gentiles into his church.

Salmasius, and Suicerus from him, deliver it as authentic history, that for the two first ages no one received baptism who was not first instructed in the faith and doctrine of Christ, so as to be able to answer for himself that he believed; because of those words, He that believeth, and is baptized; which, in effect, is to say, that no infant, for the first two ages, was ever admitted to Christian baptism. But, afterwards, they own, that pædo-baptism came in, upon the opinion that baptism was [illegible] salvation.

[illegible] age of the church there was [illegible] for the reception of [illegible] Easter, Whitsuntide, [illegible] solemn seasons, out of [illegible] was not administered, except [illegible] The catechumens, who were to receive it at these times, were called *competentes*; and to these it is that St. Cyril addresses his catecheses. In the apostolical age, and some time after, before churches and baptisteries were generally erected, they baptized in any place where they had convenience; as John baptized in Jordan, and Philip baptized the eunuch in the wilderness, and Paul the jailor in his own house. But in after ages, baptisteries were built adjoining to the church; and then rules were made that baptism should ordinarily be administered no where but in these buildings.

The following were the attendant ceremonies and manner of baptism in the ancient church. The person to be baptized was first examined by the bishop or officiating priest, who put some questions to him; as, first, Whether he abjured the devil and all his works; secondly, Whether he gave a firm assent to all the articles of the Christian faith; to both which he answered in the affirmative. After the questions and answers followed exorcism; the manner and end of which was this. The minister laid his hands on the person's head, and breathed in his face, implying thereby the driving away or expelling of the devil from him, and preparing him for baptism, by which the good and holy spirit was to be conferred upon him. After exorcism followed baptism itself, and first the minister, by prayer, consecrated the water for that use. Tertullian says, "any waters may be applied to that use; but then God must be first invocated, and then the Holy Ghost presently comes down from heaven, and moves upon them, and sanctifies them." The water being consecrated, the person was baptized "in the name of the Father, and of the Son, and of the Holy Ghost," by which "dedication of him to the blessed Trinity, the person (says Clemens Alexandrinus) is delivered from the corrupt trinity, the devil, the world, and the flesh." In performing the ceremony of baptism, the usual custom (except in clinical cases, or where there was scarcity of water), was to immerse and dip the whole body. Thus St Barnabas, describing a baptized person, says, "We go down into the water full of sin and filth, but we ascend bearing fruit in our hearts." And this practice of immersing the whole body was so general, that we find no exceptions made in respect either to the tenderness of infants, or the bashfulness of the other sex, unless in case of sickness or other disability. But to prevent any indecency, men and women were baptized apart. To which end, either the baptisteries were divided into two apartments, one for the men, the other for the women, as Bingham has observed, or the men were baptized at one time, and the women at another, as is shown by Vossius, from the Ordo Romanus, Gregory's Sacramentarium, &c. Add, that there was anciently an order of deaconesses, one part of whose business was to assist at the baptism of women. The precautions, however, rather indicate a scrupulous attention to delicacy,

that imply any indecency in the circumstance of immersion itself. From the candidates being immersed, there is at least no reason to infer that they were naked. The present Bap-[illegible]er baptize naked, though they always [illegible]erse. "After immersion followed the unction; by which (says St. Cyril) was signified that they were now cut off from the wild olive, and were ingrafted into Christ, the true olive-tree; or else to show that they were now to be champions for the gospel, and were anointed thereto, as the old athletæ were against their solemn games. With this anointing was joined the sign of the cross, made upon the forehead of the person baptized; which being done, he had a white garment given him, to denote his being washed from the defilements of sin, or in allusion to that of the apostle, "as many as are baptized in Christ have put on Christ." From this custom the feast of Pentecost, which was one of the annual seasons of baptism, came to be called Whitsunday, i. e. White-sunday. This garment was afterwards laid up in the church, that it might be an evidence against such persons as violated or denied that faith which they had owned in baptism. The forms of administering baptism in our established church are well known, and need no particular description; we shall only mention one or two of the more material differences between the form as it stood in the first liturgy of king Edward, and that in the present book of common prayer. First, the form of consecrating the water did not make a part of the office in king Edward's liturgy, as it does in the present; because the water in the font was changed, and consecrated, but once a month. The form likewise itself was something different from that now used; and was introduced with a short prayer, that "Jesus Christ, upon whom (when he was baptized) the Holy Ghost came down in the likeness of a dove, would send down the same Holy Spirit, to sanctify the fountain of baptism;" which prayer was afterwards left out, at the second review.—By king Edward's first book, the minister is to dip the child in the water thrice; first, dipping the right side; secondly, the left; the third time, dipping the face toward the font. This trine immersion was a very ancient practice in the Christian church, and used in honour of the Holy Trinity, though some later writers say, it was done to represent the death, burial, and resurrection of Christ, together with his three days continuance in the grave. Afterwards, the Arians making an ill use of it, by persuading the people that it was used to denote that the three persons in the Trinity were three distinct substances, the orthodox left it off, and used only one single immersion.

By the first common-prayer of king Edward, after the child was baptized, the godfathers and godmothers were to lay their hands upon it, and the minister was to put on him the white vestment commonly called the chrysome, and to say, "Take this white vesture, as a token of the innocency, which, by God's grace, in this holy sacrament of baptism, is given unto thee; and for a sign, whereby thou art admonished so long as thou livest, to give thyself to innocency of living, that after this transitory life thou mayest be partaker of the life everlasting. Amen." As soon as he had pronounced these words, he was to anoint the infant on the head, saying, "Almighty God, the father of our Lord Jesus Christ, who hath regenerated thee by water and the Holy Ghost, and hath given unto thee remission of all thy sins; may he vouchsafe to anoint thee with the unction of his Holy Spirit, and bring thee to the inheritance of everlasting life. Amen." This was manifestly done in imitation of the practice of the primitive church.

Sprinkling children, instead of dipping them in the font, a custom which at first was allowed only in case of the weakness or sickness of the infant, has now so far prevailed, that immersion is at length quite excluded. What principally tended to confirm the practice of affusion or sprinkling was, that several of our protestant divines, flying into Germany and Switzerland during the bloody reign of queen Mary, and returning home when queen Elizabeth came to the crown, brought back with them a great zeal for the protestant churches beyond sea where they had been sheltered and received; and having observed, that at Geneva and some other places baptism was administered by sprinkling, they thought they could not do the church of England a greater piece of service than by introducing a practice dictated by so great an oracle as Calvin. This, together with the coldness of our northern climate, was what contributed to banish entirely the practice of dipping infants in the font.

Several of the Socinians have maintained that baptism was only to be used by those who are converted to Christianity from a different profession; and that though the children of such proselytes were to be baptized with their parents, all who descended from them were to be considered as baptized in them; and they urge the practice of proselyte baptism among the Jews in support of this opinion.

Some theological authors distinguish three kinds of baptism; 1. Water baptism, which is that above mentioned. 2. Baptism of fire, which, they say, is the perfect love of God, joined with an earnest desire to be baptized, called also the baptism of the Holy Ghost. 3. Baptism of blood, which is the martyrdom of a catechumen.

Baptism of the dead, a custom which anciently prevailed among some people in Africa, of giving baptism to the dead. The third council of Carthage speaks of it as a thing that ignorant Christians were fond of. Gregory Nazianzen also takes notice of the same superstitious opinion prevailing among some who delayed to be baptized. In his address to this kind of men, he asks, whether they stand to be baptized after death? Philastrius also notes it as the general error of the Montanists or Cataphrygians, that they baptized men after death. The practice seems to be grounded on

a vain opinion, that when men had neglected to receive baptism in their life-time, some compensation might be made for this default by receiving it after death.

BAPTISM OF THE DEAD was also a sort of vicarious baptism, formerly in use, where a person dying without baptism, another was baptized in his stead, a practice founded on 1 Cor. xv. 29 concerning the sense of which passage critics have been much divided

BAPTISMAL, *a.* Something belonging to, or connected with baptism. Thus we say, baptismal engagement, baptismal presents, &c

BAPTISMAL, belonging or relating to baptism; as baptismal vow, fonts, presents, &c.

BAPTISTERY, in ecclesiastical writers, a place in which the ceremony of baptism is performed In the ancient church it was one of the exedræ or buildings distinct from the church itself, and consisted of a porch or anti-room where the persons to be baptized made their confession of faith, and an inner room where the ceremony of baptism was performed Thus it continued till the sixth century, when the baptisteries began to be taken into the church-porch, and afterwards into the church itself

The ancient baptisteries were commonly called *φωτιστηρια*, *photisteria*, q d places of illumination; an appellation sometimes given to baptism Or they might have the name for another reason, because they were the places of an illumination, or instruction, preceding baptism for here the catechumens seem to have been trained up and instructed in the first rudiments of the Christian faith

Those baptisteries were anciently very capacious, because, as Dr Cave observes, the stated times of baptism returning but seldom, there were usually great multitudes to be baptized at the same time. and then the manner of baptizing, by immersion, or dipping under water, made it necessary to have a large font likewise In Venantius Fortunatus it is called aula baptismatis, the large hall of baptism, which was indeed so capacious, that we sometimes read of councils meeting and sitting therein This hall, or chapel, was always kept shut during Lent, and the door sealed up with the bishop's seal, not to be opened till Maundy-Thursday.

BAPTISTS, in ecclesiastical history, from *βαπτιζω*, I baptize, a denomination of Christians, distinguished from other Christians by their particular opinions respecting the mode and the subjects of baptism.

It is alleged by this sect, that instead of administering the ordinance by sprinkling or pouring water, it ought to be administered only by immersion. Such being in fact the meaning of the word *βαπτιζω*, so that a command to baptize is a command to immerse. Thus it was understood by those who first administered it, John the Baptist, and the apostles of Christ administered it in Jordan and other rivers where there was much water. The administrators and the subjects are described as going down into, and coming up again out of, the water, and the baptized are said to be buried in baptism, and to be raised again, which language could not, they say, be properly adopted on supposition of the ordinance being administered in any other manner than by immersion Thus also, they say, it was in general administered in the primitive church Thus it is now administered in the Russian and Greek church and thus it is, at this day, directed to be administered in the church of England, to all who are thought capable of submitting to it in this manner

With regard to the subjects of baptism, the Baptists say, that this ordinance ought not to be administered to children or infants at all, nor to grown up persons in general, but to adults only of a certain character and description Our Saviour's commission to his apostles, by which Christian baptism was instituted, is to go and teach all nations, baptizing them, that is, not to baptize all they meet with, but first to instruct them—to teach all nations, or to preach the gospel to every creature—and whoever receives it, him to baptize in the name of the Father, and of the Son, and of the Holy Ghost To such persons, and to such only, baptism appears to have been administered by the apostles, and the immediate disciples of Christ They are described as repenting of their sins, as believing in Christ, and as having gladly received the word Without these qualifications, Peter acquaints those who were converted by his sermon, that he could not have admitted them to baptism, Philip holds the same language in his discourse with the eunuch, and Paul treats Lydia, the jailor, and others, in the same manner Without these qualifications, Christians in general think it wrong to admit persons to the Lord's supper, and, for the same reasons, without these qualifications, at least a profession of them, the Baptists think it wrong to admit any to baptism Wherefore they withhold it, not only from the impenitently vicious and profane, and from infidels who have no faith, but also from infants and children, who have no knowledge, and are incapable of every action civil and religious They further insist, that all positive institutions depend entirely upon the will and declaration of the institutor, and therefore, that reasoning by analogy from abrogated Jewish rites is to be rejected, and the express commands of Christ respecting the mode and subjects of baptism ought to be our only rule.

In England the Baptists form one of the denominations of Protestant Dissenters, They separate from the establishment for the same reasons as their brethren of the other denominations do; and from additional motives derived from their particular tenets respecting baptism The constitution of their churches, and their modes of worship, are congregational or independent; in the exercise of which they are protected in common with other dissenters by the act of toleration Before this act, they were liable to pains and penalties as Nonconformists, and often for their peculiar sentiments as Baptists. A proclamation was issued out

against them, and some of them were burnt in Smithfield in 1538. They bore a considerable share in the persecutions of the last and of the preceding centuries; and, as it should seem, in those of some centuries before, for there were several among the Lollards and the followers of Wickliff who disapproved of infant-baptism. There were many of this persuasion among the Protestants and reformers abroad. In Holland, Germany, and the North, they went by the names of ANABAPTISTS, and MENNONITES; and in Piedmont and the South, they were found among the ALBIGENSES and WALDENSES. See those articles.

The Baptists go under two denominations, viz. the Particular or Calvinistical, and the General or Arminian. The former is by far the most numerous. Some of both denominations allow of mixed communion, viz. of persons who have been sprinkled in their infancy, and therefore unbaptized in the view of the Baptists, others disallow it, and some of them observe the seventh day of the week as the sabbath, apprehending the law that enjoined it not to have been repealed by Christ or his apostles. But a difference of opinion respecting these and other matters is not peculiar to the Baptists: it is common to all Christians, and to all bodies of men who think and judge for themselves in religious matters.

The Baptists have two exhibitions for students to be educated at one of the universities in Scotland, given them by Dr Ward of Gresham college. They have likewise an academy at Bristol, generally known by the name of the Bristol Education Society, another society was formed about four years ago in London, for the instruction of young men for the pastoral office, and another institution was opened in Yorkshire about two years ago for the same purpose. Among the writers of repute in this denomination we may mention the names of Beddome, Booth, Dore, Evans, Foster, Fuller, Gill, Hall, Jenkins, Richards, Robinson, Ryland, Stennett, &c.

The ceremony of baptizing adults by immersion has too often been the subject of ridicule and misrepresentation, but we have perused with satisfaction an account of this ceremony which certainly affords no real ground of ridicule, and which we should be sorry to misrepresent. As it is too long to admit of insertion here, we must refer the candid reader to Evans's Sketch of Religious Denominations, p. 137, ed. 5, where it may be found as copied from Robinson's History of Baptism. See also Dyer's Life of Robinson.

To those who are desirous of knowing and consulting the principal works on the question of baptism the following list may be interesting. In defence of the practice of infant baptism may be mentioned Dr Fleming's "Plea for Infants," and the appendix and his defence, Dr Taylor's "Covenant of Grace, and Baptism the Token of it, explained upon Scripture Principles," Mr Brekell's "Pædobaptism," and "Pædobaptism defended," Dr Addington's "Christian Minister's Reasons for baptizing Infants, and for administering the Ordinance by sprinkling or pouring of Water;" the same author's "Summary of the Christian Minister's Reasons for baptizing Infants," Mr Amner's "Account of the Occasion and Design of the positive Institutions of Christianity;" Mr Robin's edition of Matthew Henry's Manuscript Treatise on Baptism, and Dr Edward Williams's "Antipædobaptism examined."

On the opposite side of the question, recourse may be had to Mr Burroughs's "Two Discourses on positive Institutions;" Dr Gill's "Answer to Mr Towgood's Baptism of Infants a reasonable Service;" the same writer's "Antipædobaptism, or Infant Baptism an Innovation;" Dr Stennett's "Remarks on the Christian Minister's Reasons for administering Baptism by sprinkling, &c.;" Mr Jenkins's "Inconsistency of Infant Sprinkling with Christian Baptism, with religious Usefulness, and with Salvation by Christ alone;" Mr Maclean's "Christ Commission," Mr Richards's "History of Antichrist, or Free Thoughts on the Corruptions of Christianity;" Mr Booth's "Pædobaptism examined, &c." Mr Robinson's "History of Baptism" and his "Ecclesiastical Researches," Mr Ashdowne's "New and decisive Proofs from Scripture and Reason, that Adults only are included in the Design of the new Covenant," &c.

To these may farther be added, Mr De Courcy's "Letter to a Baptist Minister," his "Word to Parmenas," "Reply to Parmenas," and "The Rejoinder." Mr Booth's Defence of "Pædobaptism examined." Mr W. Miller's "Catholic Baptism examined," and his "Pædobaptist Mode of administering the baptismal Ordinance defended." Mr Peter Edwards's "Candid Reasons for renouncing the Principles of Antipædobaptism," Dr Jenkins' Answer in a "Defence of the Baptists, &c." Mr Edwards's "Critical Remarks on Dr Jenkins's Defence of the Baptists." Mr Dore's "Sermons on Baptism."

To BAPTI'ZE. *v. a.* (*baptiser*, French, from βαπτιζω.) To christen, to administer the sacrament of baptism to one (*Rogers*).

BAPTI'SER. *s.* (from *to baptise*.) One that christens, one that administers baptism.

BAR. *s.* (*barre*, French.) 1. A piece of wood, or other matter, laid across a passage to hinder entrance (*Exodus*). 2. A bolt (*Nehemiah*). 3. Any obstacle (*Daniel*). 4. A rock, or bank of sand, at the entrance of a harbour. 5. Any thing used for prevention (*Hooker*). 6. The place where causes of law are tried (*Dr.*). 7. An enclosed place in a tavern, where the housekeeper sits (*Addison*). 8. (In law.) A peremptory exception against a demand or plea (*Cowell*). 9. Any thing by which the compages or structure is held together (*Jonah*).

BAR, BARR, or BARRE, in heraldry, denotes an ordinary nearly resembling the fess; from which it only differs by its narrowness, and by this, that the bar may be placed in any part of the field, whereas the fess is confined to a single place.

BAR, or the BARROIS, a late duchy of France, which now forms the department of the Meuse.

BARS, or BINDERS, in the manage, those portions of the crust or hoof of a horse that are reflected inwards, and form the arches which are situated between the heels and the frog "They are formed," says Mr. St. Bell, "by the continuation of the fibres of the heels, which turn towards each other, and, advancing to the extremity of the frog, where they meet, form an acute angle, and acting by mutual resistance from within, outwardly oppose the contraction of the heels" See FOOT

BARS also denote the fleshy rows that run across the upper part of the mouth of a horse, and reach almost quite to the palate, very distinguishable in young horses On the bars the bit should rest and have its appui, for though a single cannon bears upon the tongue, the bars are so sensible and tender that they feel the effects of it through the thickness of the tongue

The bars should be sharp ridged and lean, for since all the subjection a horse bears proceeds from these parts, if they have not those qualities they will be very little or not at all sensible, so that the horse can never have a good mouth If the bars be flat, round, and insensible, the bit will not have its effect, and consequently such a horse can be no more governed by his bridle than if we took hold of his tail

BARS, in music, denote strokes drawn perpendicularly across the lines of a piece of music, including between each two a certain quantity or measure of time, which is various as the time is triple or common

In common time between each two bars, is included the measure of four crotchets; in triple time, three crotchets Their principal use is, to regulate the beating, or measure of the musical time in a concert See TIME

Besides the bar or single bar above described, it will be proper to regard the following

The Double Bar introduced to mark the end of a strain, or a change in the measure, or time

The Dotted Bar used to signify that the preceding and following strains are to be repeated

The Half-dotted Bar shewing that the strain on the same side of the bar with the dots is to be repeated

BAR, v. a. (from the noun.) 1 To shut with a bolt or bar (*Swift*) 2 To hinder (*Shakespeare*) 3. To exclude (*Sidney*). 4. To shut out. 5. To prohibit (*Addison*). 6. To except.

BARRING A VEIN, an operation performed by farriers on the veins of a horse's legs and the vein when become diseased or varicous In order to bar a vein, the farrier opens the skin above it, and after disengaging it, and tying it above and below, he divides the vein between the two ligatures.

BAR LE DUC, the capital of the territory of Bar, now of a district in the department of Meuse, in France, having a strong castle It is 126 miles E. of Paris. Lat. 48 44 N Lon. 5 30 E

BAR-SUR-AUBE, a town of France, in the department of Aube, and late province of Champagne Lat 48 15 N Lon. 4 55 E

BAR-SUR-SEINE, a town of France, in the department of Aube. Lat. 48 5 N Lon 4. 32 E

BARA, one of the Hebrides, to the south of St. Uist. Lat 56 55 N. Lon. 7 30 W.

BARA, the name of a very extraordinary festival celebrated at Messina, in honour of the assumption of the Virgin At this feast a great number of children, who represent the Virgin, the apostles, cherubim, and seraphim, are placed upon a large whirling machine, which is turned round by a number of monks When the whole is in motion, it is said to represent the situation of the apostles, &c when gazing at the ascending Virgin The people are so delighted with this festival, that parents very ardently solicit for the felicity of having their children among the apostles or cherubim at the Bara

BARABINIANS, a nation of the Russian empire, also called BARABINZIANS See below

BARABINZIANS, a tribe of Tartars, living on both sides of the river Irtis. They seem to derive their name from the Barabaian desart, whose lakes supply them abundantly with fish, on which and their cattle they chiefly subsist They have plenty of game and wild-fowl of every kind, particularly ducks and puffins Most of them are heathens, but Mahometanism daily gains ground among them.

BARACH, (from *borak*, splendid, Arab) Nitre

BARACKS See BARRACKS.

BARÆ, in ancient geography, a people of India, placed by Ptolemy near the Ganges

BARALIPTON, among logicians, a term denoting the first indirect mode of the first figure of syllogism A syllogism in baralipton, is when the two first propositions are general, and the third particular, the middle term being the subject in the first proposition, and the predicate in the second The following is of this kind.

BA. Every evil ought to be feared
RA. Every violent passion is an evil,
LIP Therefore something that ought to be feared is a violent passion

BARANGI, officers among the Greeks of the lower empire, whose business it was to keep the keys of the city-gates where the emperor resided. Codinus says, barangi were those who stood guard at the door of the emperor's bed-chamber and dining-room Cocandiconpolate observe, that the name is

English, formed from bar, to shut; and that the barangi were Englishmen, by country; Anglo-Danes, who, being driven out of England, were received into the service of the emperor of Constantinople, and made guards ... person. Whence they are ... Latin, by Cujaccius, protectores; by ... securigeri, as being armed with a battle-... securis. Codinus adds, that they still spoke the English tongue Anna Comnena says, the barangi came from the island Thule, by which is, doubtless, meant our island.

BARA-PICKLET, bread made of fine flour kneaded with barm, which makes it very light and spongy. bara being the Welch for bread In the north of England it is formed into flat cakes, which are called picklets

BARATHRUM, in antiquity, a deep dark pit at Athens, into which condemned persons were cast headlong It had sharp spikes at the top, that no man might escape out, and others at the bottom, to pierce and torment such as were cast in.

BARATIER (John Philip), an extraordinary youth, born at Schwobach, near Nuremburg, in 1721 At five years old he is said to have understood Greek, Latin, German, and French His father, who was minister of the French church at Schwobach, then taught him Hebrew, and at 9 years of age he was able to translate any part of the Scripture into Latin In 1731, he was entered in the university of Altdorf, and the same year wrote a letter to M. le Maitre on a new edition of the Bible, Hebrew, Chaldaic, and Rabbinical, which is inserted in the Bibliotheque Germanique The year following, he published the travels of Benjamin of Tudela, translated from the Hebrew into French In 1734, the margrave of Anspach settled upon him a pension of 50 florins a year, and gave him the free use of his library. In 1735, he sent a scheme for finding the longitude to the Royal Society, but it was found to have been an old invention, and insufficient. He was the same year admitted a member of the academy at Berlin. Soon afterwards he published a work against the Socinians, called, Anti-Artemonius, 8vo, 1735. The same year he was created M A. by the university of Halle This wonderful youth died of a decline in 1740, aged little more than 19. Besides the works abovementioned, he wrote some critical dissertations upon points of ecclesiastical history in the Bibliotheque Germanique (*Watkins*)

BARATRY, in law, the moving suits, taking and detaining houses and lands, &c., upon false inventions. In a marine sense, baratry denotes the cheating either the owners or insurers of ships, by sinking the vessel, deserting her, embezzling the cargo, &c., whether by master or mariners.

BARB (s. *barba*, a beard, Latin.) 1 Any thing that grows in the place of a beard (*Walton*) 2 The point that stands backward in an arrow, or fishing-hook (*Pope*). 3. The armour for horses (*Hayward*).

BARB, or BARBE, a kind of horse brought from Barbary, much esteemed for its beauty, vigour, and swiftness (See HORSE.) These horses are usually very elegant, of a slender make, and have very fine limbs and fine turned bodies. The Spanish and English horses have much fuller bodies, and larger legs The barb is little inferior to the Arabian or Turkish horse; but he is esteemed by our dealers too tender and delicate to breed from The Turkish and the Spanish horses are therefore usually kept for this purpose by the nicer judges.

BARB (γλωχις, *glochis*.) In botany, a straight process, armed with several teeth pointing backwards, like the sting of a bee. This is one sort of pubescence in plants, and is distinguished from the hook (*hamus*) by the point not being bent.

BARB In botany See BEARD

To BARB *v a* (from the noun) 1 To shave, to dress out the beard (*Shakspeare*). 2. To furnish horses with armour (*Dryden*). 3 To jag arrows with hooks (*Philips*).

BA'RBACAN *s* (*barbacane*, French.) 1. A fortification before the walls of a town (*Spenser*) 2 A fortress at the end of a bridge. 3 An opening in the wall through which the guns are levelled.

BARBACE'NIA In botany, a genus of the class hexandria, order monogynia Calyx superior, six-toothed, corol six-petalled, filaments petal-shaped, toothed, capsule glandular, three valved, many-seeded One species only, a native of Brasil

BARBA CAPRIÆ See ULMARIA.

BARBA HIRCI See TRAGOPOGON.

BARBA JOVIS See SEDUM MAJUS

BARBADOES, the most easterly of the Caribbee islands, in the West Indies. It is in general a level country, though a little diversified with hills When the English first landed here it had not the least appearance of having ever been peopled, even by savages, there not being any kind of beast of pasture or prey, no fruit, herb, nor root, fit for the support of human life The number of white inhabitants is about 20,000, and the negro slaves amount to about 100,000 This island is subject to hurricanes, particularly in July and August. It was nearly ruined by the dreadful hurricane which happened in October 1780. It is about 25 miles long, and 15 broad. The capital of Barbadoes is Bridge-town, which is situated in lat. 13. 10 N lon 59 10 W The other towns are Ostins or Charles-town, St. James's, and Speight's-town

BARBADOES CHERRY The fruit of the malphigia glabea of Linnéus. These cherries are of a red colour, of the size of small cherries, and are gathered and eaten by the inhabitants of the West-India islands, particularly Barbadoes In moderate quantity they are considered as wholesome, though very inferior to cherries.

BARBADOES NUT See RICINUS MAJOR.

BARBADOES TAR See PETROLEUM BARBADENSE, and BITUMEN.

BARBARA, among logicians, the first mode of the first figure of syllogisms. A syllo-

gism in barbara is one whereof all the propositions are universal and affirmative, the middle term being the subject of the first proposition, and attribute in the second

Examp Bar. Every wicked man is miserable,
Ba All tyrants are wicked men;
Ra Therefore all tyrants are miserable

BARBARÆA The leaves of this plant, erysimum barbaræa, folus lyratis, extimo subrotundo of Linnéus, may be ranked amongst the antiscorbutics they are seldom used

BARBARIAN, a name given by the ancient Greeks and Romans to all who were not of their own country, or were not initiated in their language, manners, and customs. In this sense, the word signified with them no more than foreigner, not signifying, as among us, a wild, rude, or uncivilized person Strabo derives the word βαρβαρος from βαρβαριζειν, *balbutire*, because foreigners coming to Athens used to stammer, or speak coarsely Others derive it from βαρβαρ, a word that foreigners frequently stumbled on, which yet had no meaning

Barbarian, likewise, denotes an inhuman person, a man void of pity or feeling

BARBARICARII, in antiquity, artists who decorated shields with gold and silver Sometimes the word is used for those who wore shields or masks thus decorated

BARBA'RICK *a* (*barbaricus*, Latin) Foreign, far-fetched (*Milton*)

BARBARISM, in grammar, denotes an offence against the purity of style or language A barbarism differs, according to Isidore, from a barbarous term, as the former, for instance, is Latin, though corrupt or misused, whereas the latter, which this writer called barbarologia, is a word merely foreign, intruded into Latin speech

In general, under the term barbarisms are comprehended things written, spoken, declined, or conjugated wrong, or used in a wrong quantity, or in an unusual sense, as when a word is used which is foreign to the language, and not received by the better and purer sort of writers Such are *liper* for *liber*, *syllăba* for *syllāba*, *patri* for *patris*, *leri* for *legi*, *bannus* for *proscriptio*, &c Barbarism is often charged, with great justice, on modern writers in the learned languages The Latin books of late ages are full of Anglicisms, Gallicisms, Germanicisms, &c , according to the country of the author But what shall we say to Caspar Scioppius, who accuses Cicero himself of barbarisms in his own language?

Barbarism, Barbaries, is also used for that rudeness of mind, wherein the understanding is neither furnished with useful principles, nor the will with good inclinations

BARBARITY *s* (from *barbarous*) 1 Savageness, incivility 2 Cruelty, inhumanity (*Clarendon*) 3 Impurity of speech (*Sw*)

BA'RBAROUS *a* (*barbare*, French) 1 Stranger to civility, savage; uncivilized (*Da*) 2 Ignorant, unacquainted with arts (*Dry*) 3 Cruel; inhuman (*Clarendon*).

BA'RBAROUSLY *ad* (from *barbarous*) 1. Ignorantly; without knowledge or arts 2 In a manner contrary to the rules of speech 3 Cruelly; inhumanly (*Spectator*).

BA'RBAROUSNESS *s* (from *barbarous*) 1 Incivility of manners (*Temple*) 2. Impurity of language (*Brerewood*) 3. Cruelty (*Hale*).

BARBARUS, in ichthyology, a species of syngnathus, found in European seas, having neither caudal nor anal fin, body six-sided

BARBARY, a country of Africa, included between the Atlantic ocean, the Mediterranean sea, and Egypt, and containing the kingdoms of Barca, Tripoli, Tunis, Algiers, Fez, and Morocco It is near 2000 miles in length, and, in some places, 750 in breadth It was known to the ancients by the names of Mauritania, Numidia, Proper Africa, and Libya It is the best country in all Africa, except Egypt, and fertile in corn, maize, wine, citrons, oranges, figs, almonds, olives, dates, and melons Their chief trade consists in their fruits, in the horses called barbs, Morocco leather, ostrich-feathers, indigo, wax, tin, and coral The established religion is the Mahometan, and there are some Jews; but no Christians, except the slaves

Concerning the origin of the name Barbary there are many conjectures According to some, the Romans, after they had conquered this large country, gave it that name out of contempt and dislike to the barbarous manners of the natives, according to the custom of calling all other people but themselves barbarians Marmol, on the contrary, derives the word Barbary from Berber, a name which the Arabs gave to its ancient inhabitants, and which they retain to this day in many parts of the country, especially along the great ridge of the mountains of Atlas, and which name was given them on account of the barrenness of their country According to Leo Africanus, the name of Barbary was given by the Arabs on account of the strange language of the natives, which appeared to them more like a murmur or grumbling of some brute animals than articulate sounds Others, however, derive it from the Arabic word *bar*, signifying a desert twice repeated, which was given by one Ifric, or Africus, a king of Arabia, from whom the whole continent of Africa is pretended to have taken its name According to them, this king being driven out of his own dominions, and closely pursued by his enemies, some of his retinue called out to him *bar*, *bar*, that is, To the desert, To the desert, from which the country was afterwards called Barbary

Among the Romans this country was divided into the provinces of Mauritania, Africa Propria, &c and they continued absolute masters of it from the time of Julius Cæsar till the year of Christ 428

BARBATE In botany See Bearded

BARBATELLI (Bernardino), an eminent

Italian painter He was the disciple of Ghirlandaio, at Florence He afterwards went to Rome, where he studied with so much assiduity, as frequently to forget the refreshments of food and sleep He excelled in painting history, fruit, animals, and flowers He died in 1612, aged 70

BARBE, or BARB See BARB

BARBE, in the military art To fire in barbe, means to fire the cannon over the parapet, instead of firing through the embrasures, in which case, the parapet must not be above three feet and a half

BARBE, or BARDE, is an old word, denoting the armour of the horses of the ancient knights and soldiers, who were accoutred at all points It is said to have been an armour of iron and leather, wherewith the neck, breast, and shoulders of the horse were covered

BARBE, (St) a town of New Biscay, in Mexico, North America In its neighbourhood are several silver mines Lat 26 0 N Lon 107 5 W

BARBECINO, a territory of Africa, over against the Cape de Verd Islands

To BARBECUE *v a* To dress a hog whole, by broiling (*Pope*)

BA'RBECUE *s* A hog drest whole

BARBED *particip a* (from *to barb*) 1 Furnished with armour (*Shakspeare*) 2 Bearded, jagged with hooks (*Milton*)

BARBED AND CRESTED, in heraldry, an appellation given to the combs and gills of a cock, when particularized for being of a different tincture from the body

A barbed cross, is a cross the extremities whereof are like the barbed irons used for striking great fish

BARBEL, in ichthyology See CYPRINUS

BARBELICOTÆ, an ancient sect of gnostics, spoken of by Theodoret Their ceremonies were abominable, and their doctrines too ridiculous to deserve a particular description

BARBER, (from *barba*, a beard,) one who makes a trade of shaving the beards and heads of men, and of making wigs, &c Formerly the business of a surgeon was united to that of a barber, and he was denominated a barber-surgeon This union of profession was dissolved by a statute of Henry VIII, by which the surgeons were formed into a distinct corporation, that existed till the late establishment of the Royal College of Surgeons of London In England a musical instrument was part of the furniture of a barber-surgeon s shop, which was used by persons above the ordinary level of life, who resorted thither for the cure of wounds, for bleeding, or trimming, a word that signified shaving, and cutting, or curling the hair Bleeding and tooth-drawing are now very commonly practised in country places by barbers, and the pole stuck out as the sign of their profession, is supposed to indicate the staff which is held in the patient s hand during the act of bleeding, and the fillet with which it is wound, tied up after the operation is completed

BARBERS (Company of) See COMPANY

BA'RBER *s* (from *to barb*) A man who shaves the beard (*Wotton*)

To BA'RBER *v a* (from the noun) To dress out, to powder (*Shakspeare*)

BA'RBER-CHIRURGION *s* A man who joins the practice of surgery to the barber s trade; a low practiser of surgery (*Wiseman*)

BARBERINO, a town of Tuscany, in Italy, at the foot of the Appennines. Lat 43 59 N Lon 11 15 E

BA'RBER MONGER *s* A fop, a man decked out by his barber (*Shakspeare*)

BA'RBERRY *s* (*berberis*, Lat) Pipperidge bush See BERBERIS

BARBET, in mastiology See CANIS

BARBET, in ornithology See BUCCO

BARBETS, in geography, the name of the inhabitants of several valleys in Piedmont

BARBEYRAC (John), was born in Besiers, in Lower Languedoc, in 1674 He was made professor of law and history at Lausanne, in 1710, which he enjoyed for seven years, and during that time was three times rector in 1717, he was professor of public and private law at Groningen He translated into French the two celebrated works of Puffendorf, his Law of Nature and Nations, and his Duties of a Man and a Citizen, to both which he wrote excellent notes, and to the former an introductory preface He translated also Grotius s treatise De Jure Belli ac Pacis, with large and excellent notes, and several of Tillotson s sermons He wrote a work entitled Traite de Jeu, two vols 8vo

BARBICAN See BARBACAN

BARBIERI (John Francis), an eminent historical painter, born near Bologna, in 1590, and who studied under the Caracci He followed the manner of Caravaggio His taste of design was natural, easy, and often grand, but without any extraordinary share of elevation, correctness, or elegance The airs of his heads often want dignity, and his local colours want truth However, there is great union and harmony in his colours, although his carnations are not very fresh, and in all his works there is a powerful and expressive imitation of life, which will for ever render them estimable Towards the decline of his life, he observed that the clearer and brighter style of Guido and Albano had attracted the admiration of all Europe, and therefore he altered his manner, even against his own judgment But he apologized for that conduct, by declaring, that in his former time he painted for fame, and to please the judicious, and he now painted to please the ignorant, and enrich himself He died in 1666 The most capital performance of Guercino, is the history of S Petronilla, which is considered as one of the ornaments of St Peter s at Rome, and is much admired by travellers

BARBILLONS in the natural history of insects, are certain bodies, usually two in number, placed under the creature's head, and moveable at pleasure, somewhat resembling hands or fingers placed on a short or broken

arm. The word is a diminutive of the French *barbe*, beard.

BARBING is sometimes used in ancient statutes for shearing Cloth is not to be exported till it be barbed, rowed, and shorn 3 Hen VII c 11

BARBITOS, or BARBITON, an ancient instrument of music, mounted with three, others say seven, strings, much used by Sappho and Alcæus, whence it is also denominated Lesboum.

BARITONO, a male voice, the compass of which partakes of those of the common bass and the tenor

BARBS, or BARBLES, small excrescences under the tongue of a horse, which may be discovered by drawing it aside They are cured by cutting them close off, and touching the roots with lunar caustic

BARBUDA, one of the Caribbee islands in the West Indies, about twenty miles long, and twelve wide The land is low, fruitful, and populous It is the property of the Codrington family Lat 18 30 N Lon 61 50 W

BARBUS, in ichthyology See CYPRINUS

BARCA, a country of Africa, between Tripoli and Egypt It is a barren desert, chiefly inhabited by some tribes of wandering Arabs In this country stood the famous temple of Jupiter Ammon, and notwithstanding the pleasantness of the spot where it was erected, this part of the country is said to be the most dangerous of any, being surrounded with vast tracks of quick and burning sands, which are very detrimental to travellers, not only as they sink under their feet, but being light, and heated by the rays of the sun, are easily raised by every trifling breeze of wind, which, if it be in their faces, almost burns their eyes out, and stifles them, or, if vehement, overwhelms them Cambyses, the king of Persia, dispatched a formidable army, which consisted of 50,000 men, against this temple, they set out from Thebes, in Upper Egypt, and under the conduct of proper guides reached the city of Oasis, seven days journey from that place, but what was their fate afterwards is uncertain, as none of them ever returned to their own country again. The Ammonians informed Herodotus, that, after the army had entered the sandy desert which lies beyond Oasis, a violent wind began to blow from the south, at the time of their dinner, which raised the sand to such a degree, that the whole army was overwhelmed and buried alive

BARCALAO, a Spanish word the French pronounce it *baccalau*, and give the name to the cod-fish

BARCAROLLA, in music, a song in the Venetian language, sung at Venice by the gondoliers the airs are often composed by the gondoliers themselves, and are celebrated by Rousseau and the earl of Leicester, for the sweetness and naiveté of their melodies

BARCELONA, a large and strong city of Catalonia, in Spain It is the see of a bishop, and has a good harbour It contains about 15,000 houses It is divided into the New and Old Towns, which are separated from each other by a wall and a ditch The inhabitants carry on an extensive trade This city was united to the crown of Arragon in 1131, by the marriage of don Raymond V count of Barcelona, with the daughter of don Ramiro the monk, king of Arragon It was taken by the French after a siege of fifty-two days, in 1697 Lord Peterborough got possession of it in 1705, and in 1714 it was taken by the French and Spaniards, after a long siege, when it was deprived of its privileges, and the citadel built to keep it in awe It is 250 miles E of Madrid Lat 41 26 N Lon 2 13 E

The port of Barcelona exports its silks, middling cloths, and cotonades, wines, brandies, and other productions, and if we wish to judge of the part the Catalonians take in this commerce, it must be observed, that in 1782, out of six hundred and twenty eight vessels which entered Barcelona, three hundred and seventeen belonged to Spain It is true that silks from Lyons, stockings from Nimes, several kinds of stuffs and cottons, notwithstanding the prohibition, and particularly dried cod, an article for which Spain pays annually to the English three millions of piastres, pass into Catalonia by the same port Barcelona was erected into a county by Charlemagne, and became an independent sovereignty in the year 873 or 884 The king of Spain is called the count of Barcelona The diocese contains 213 parishes, besides eight in the city

BARCELORE, a town on the Malabar coast, in the East Indies Lat 13 25 N Lon 74 15 E

BARCELOS, a town of Portugal, in the province of Entre Minho e Douro Lat 41 30 N Lon 8 20 W

BARCHOCHEBAS See BARCOCHEBAS

END OF THE FIRST VOLUME

T DAVISON, Printer, Whitefriars.

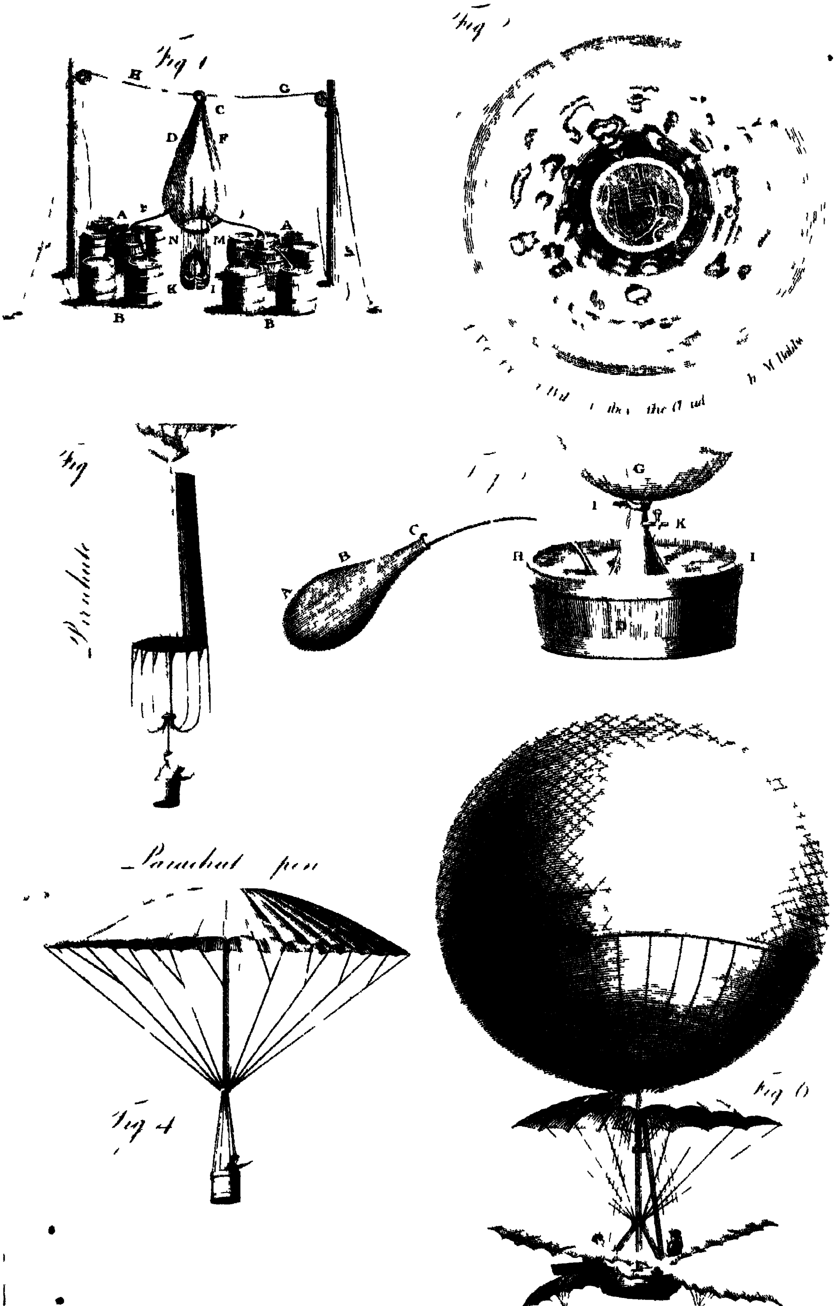
Fig 1
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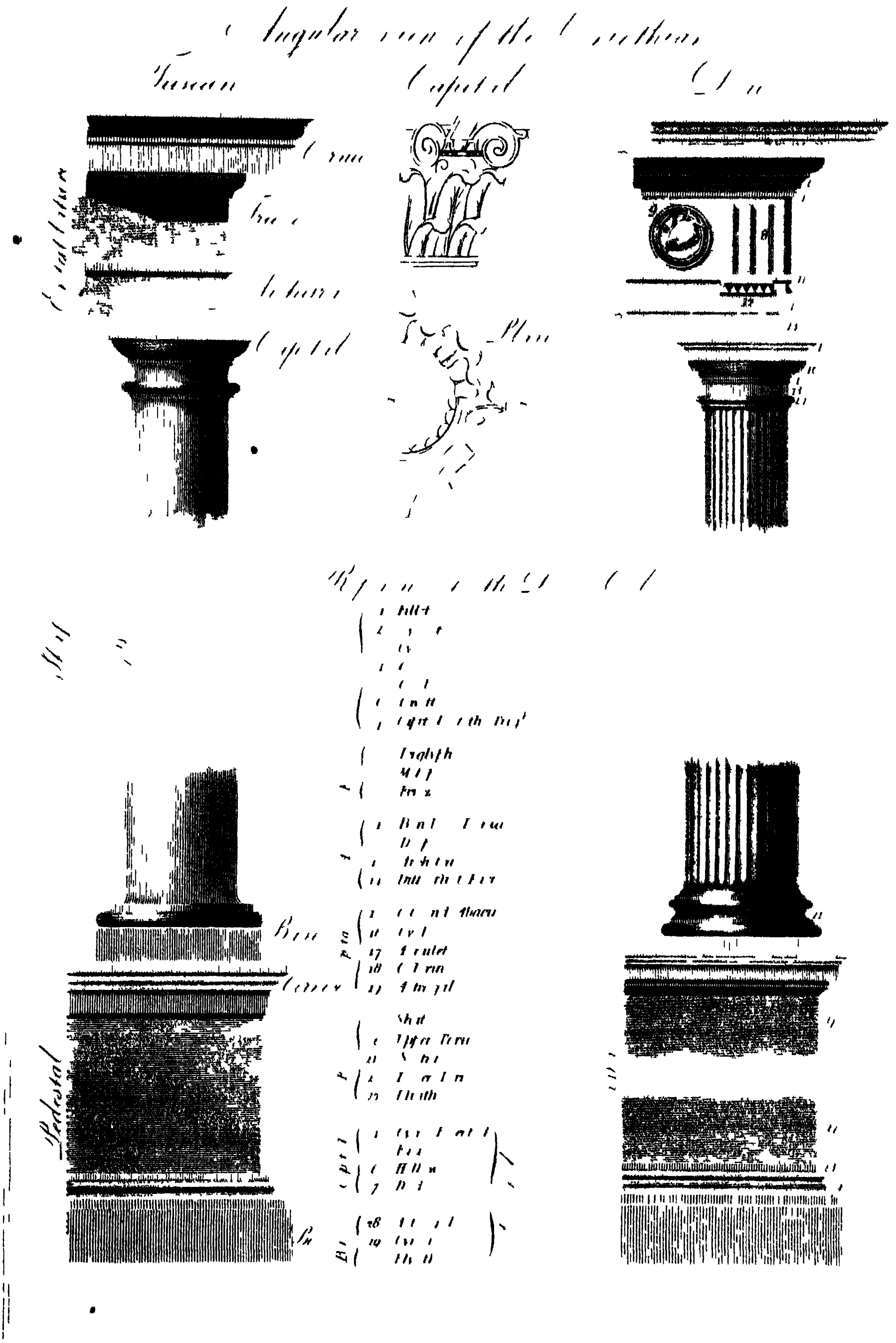
Tuscan
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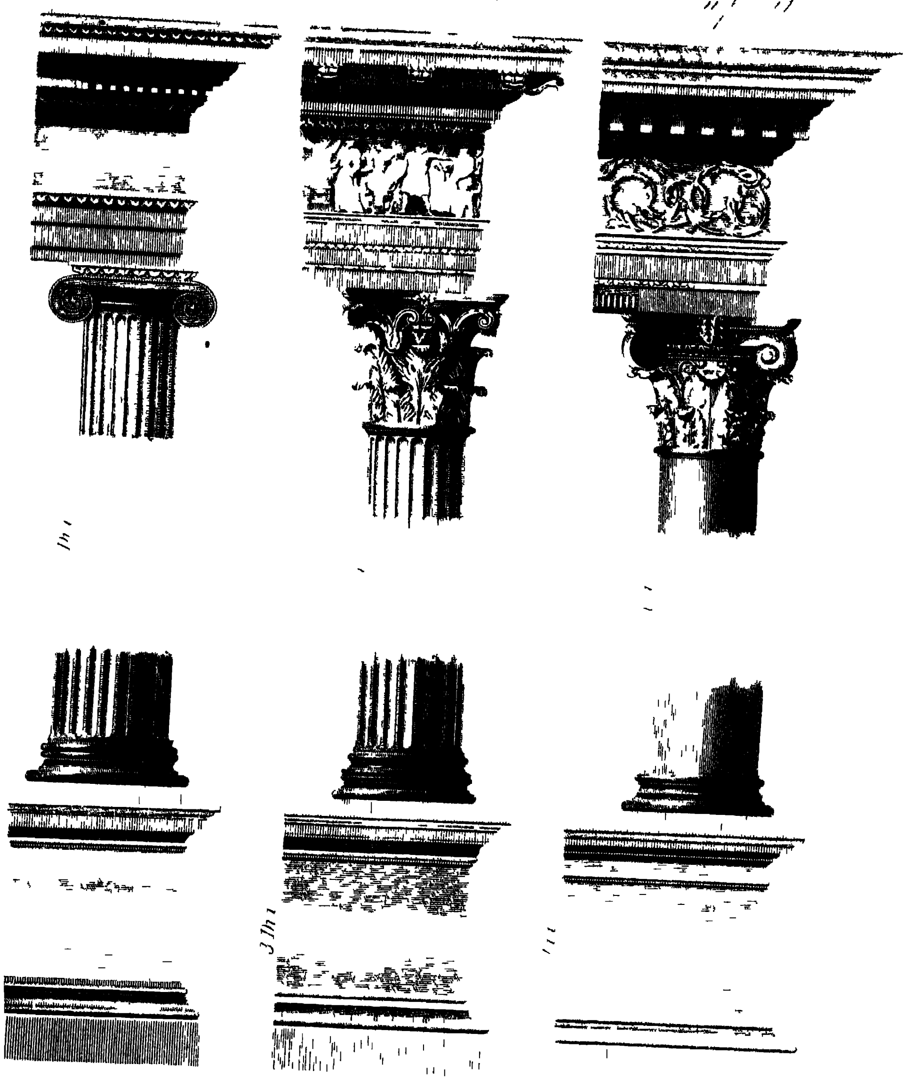
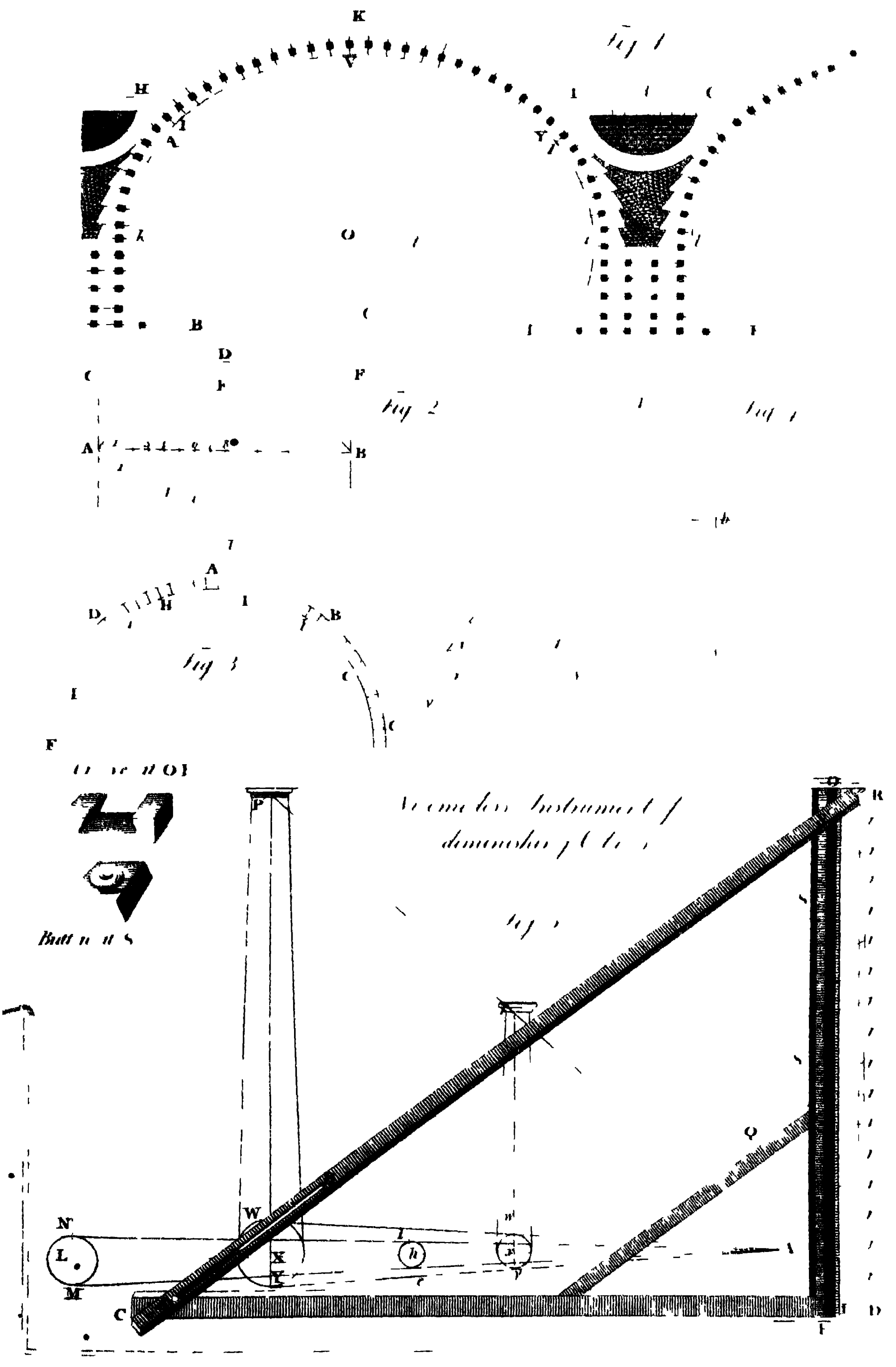
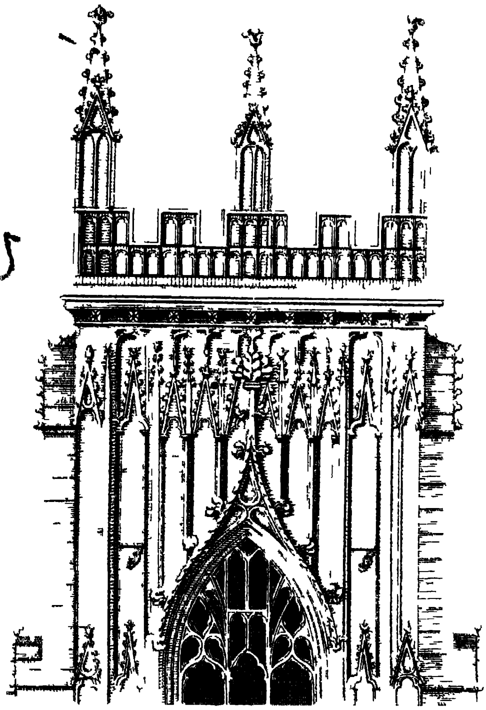
Pedestal

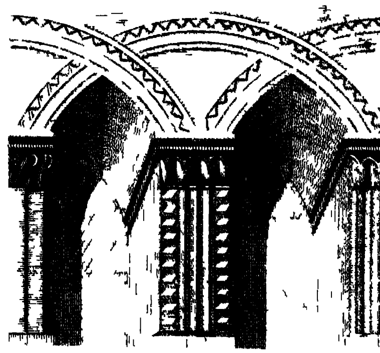
ARCHITECTURE

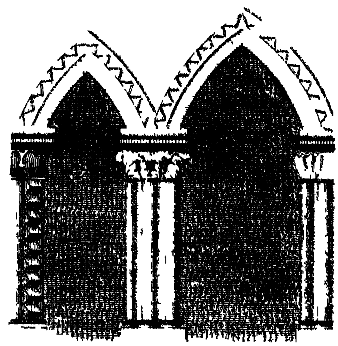


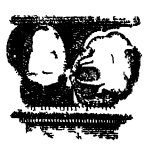


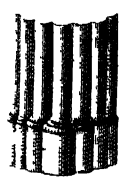
Tower of York Minster

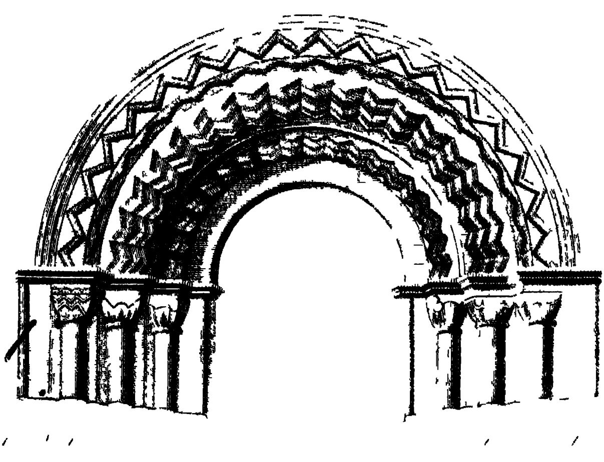


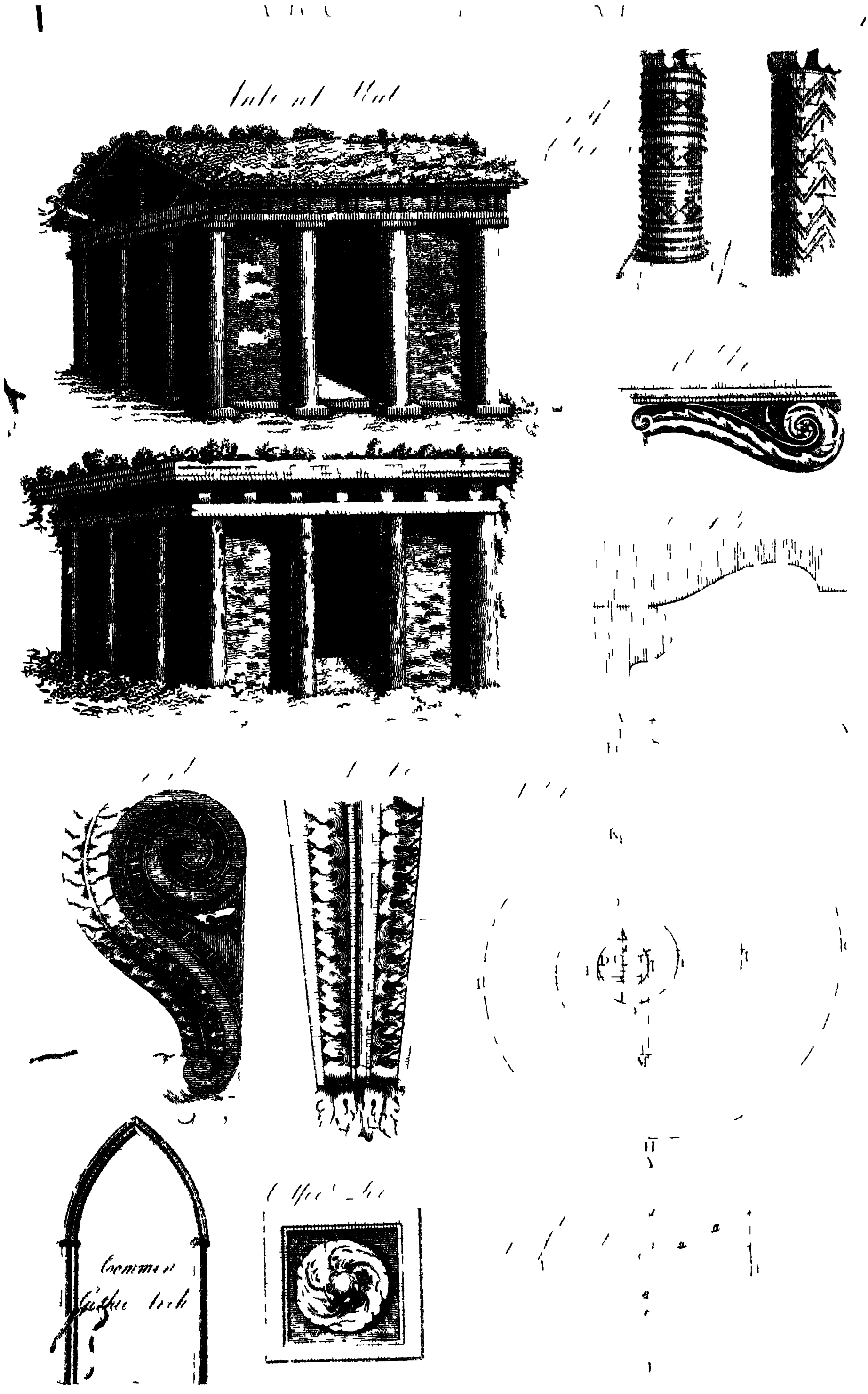


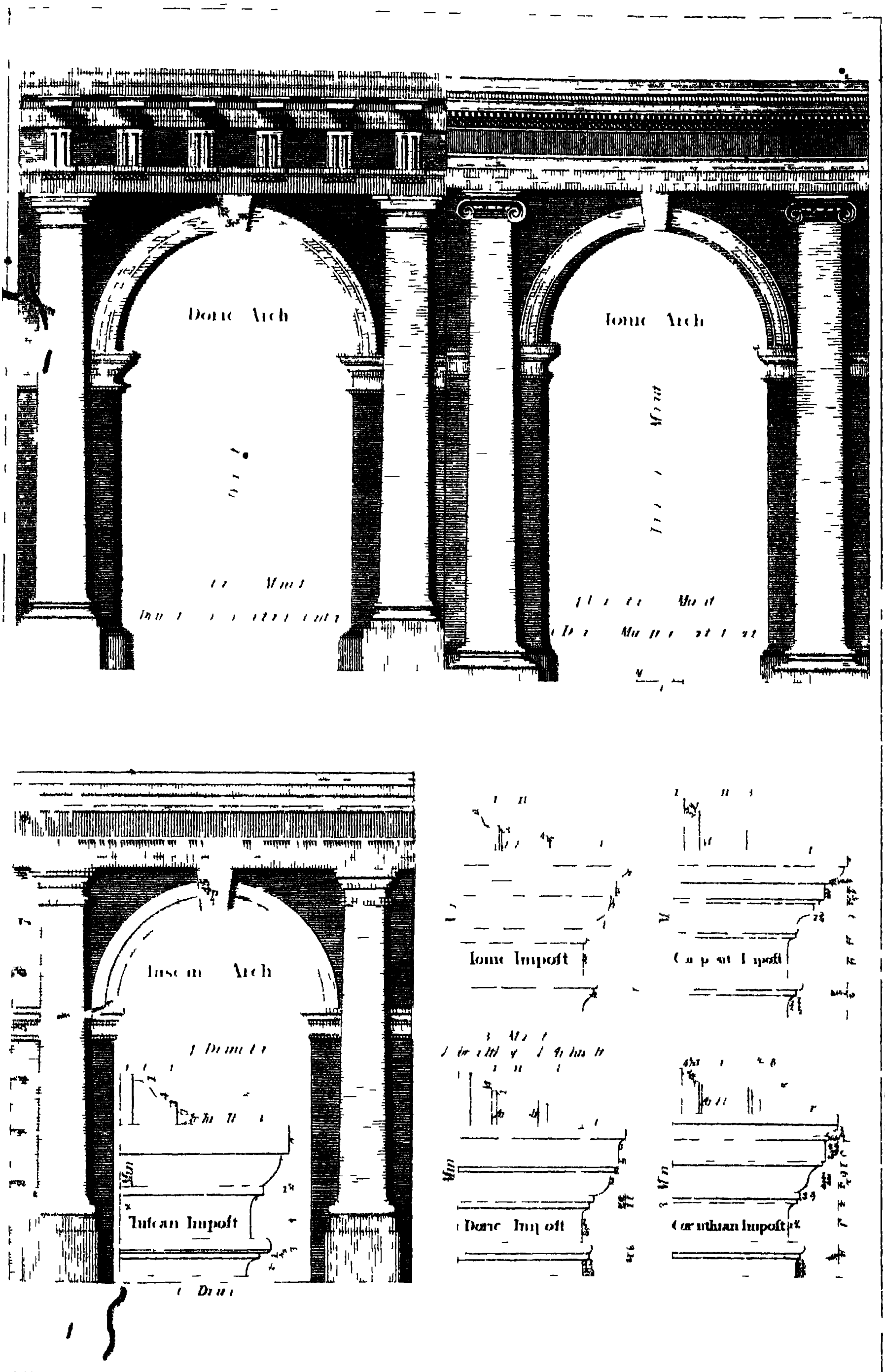


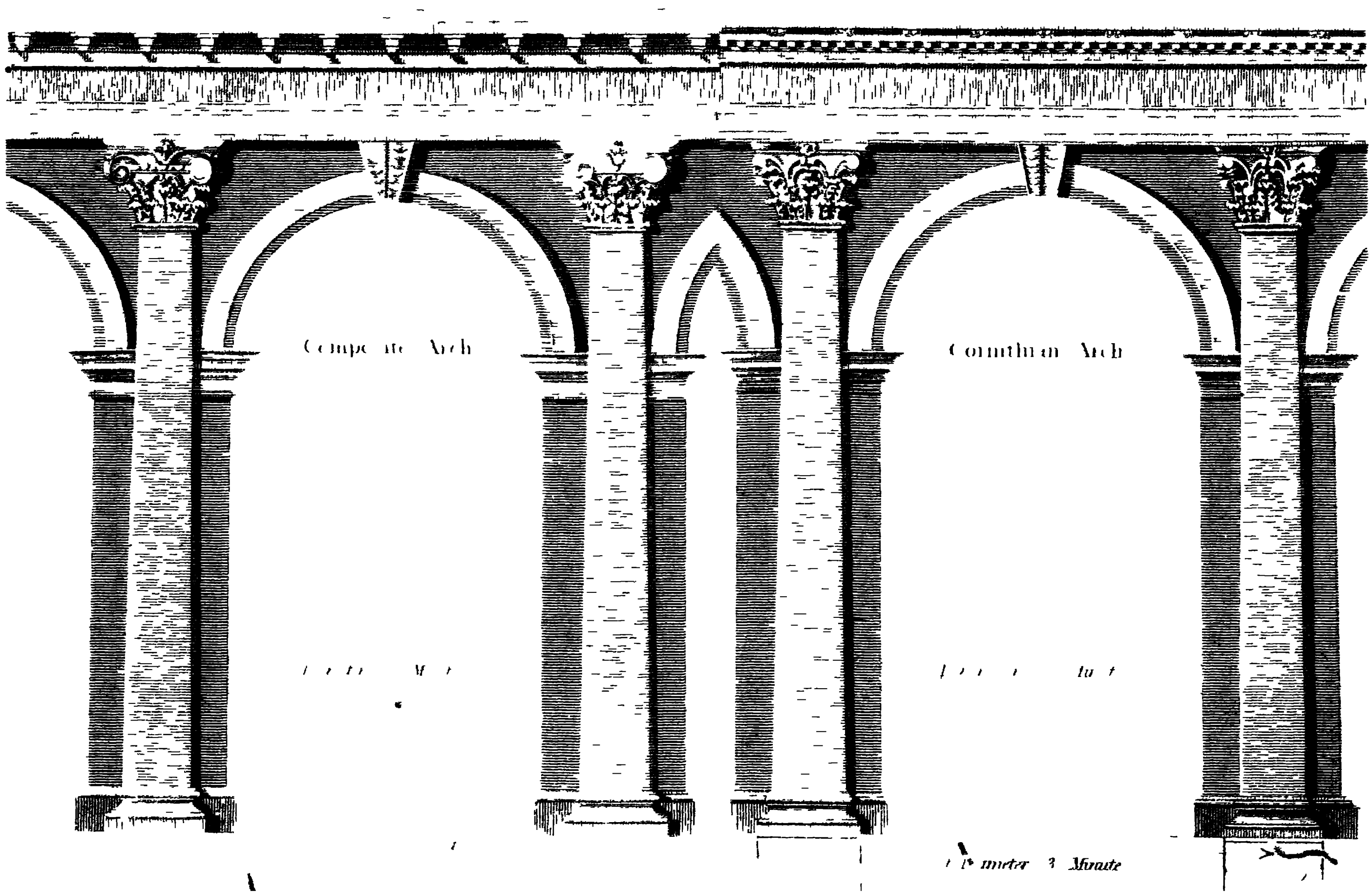







Common
Gothic Arch

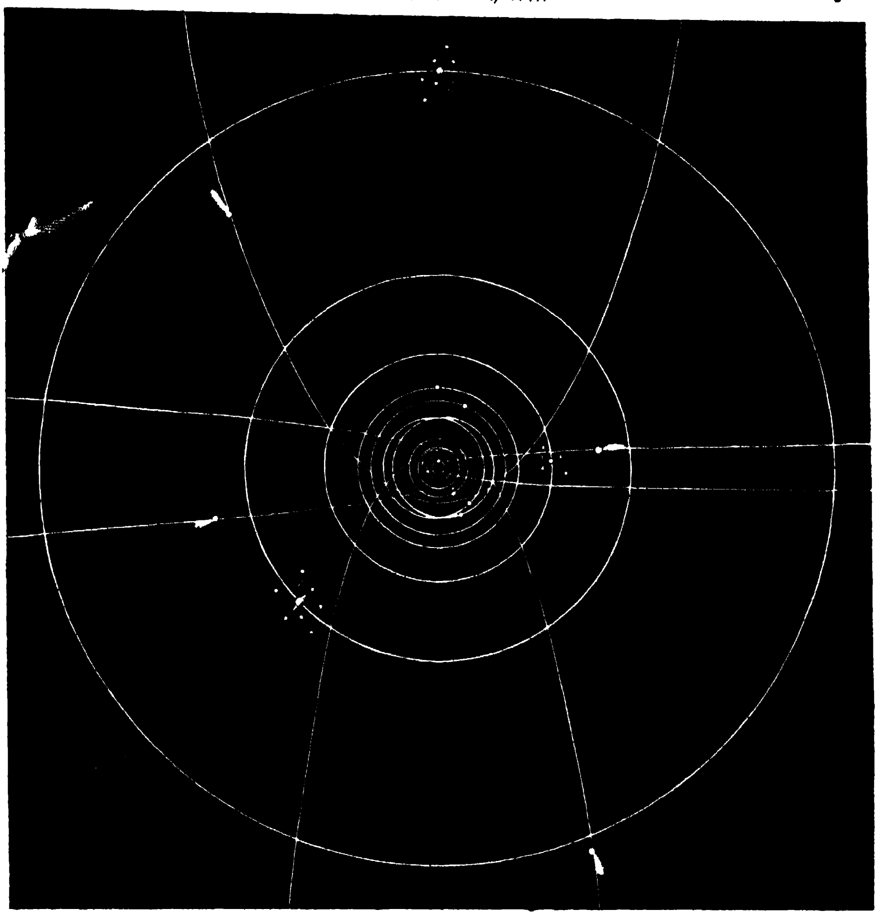

Doric Arch
Ionic Arch
Tuscan Arch
Ionic Impoſt
Tuscan Impoſt
Doric Impoſt
Corinthian Impoſt

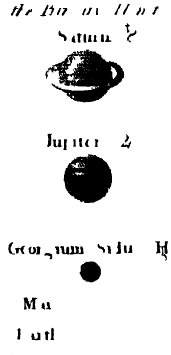


Composite Arch
Corinthian Arch

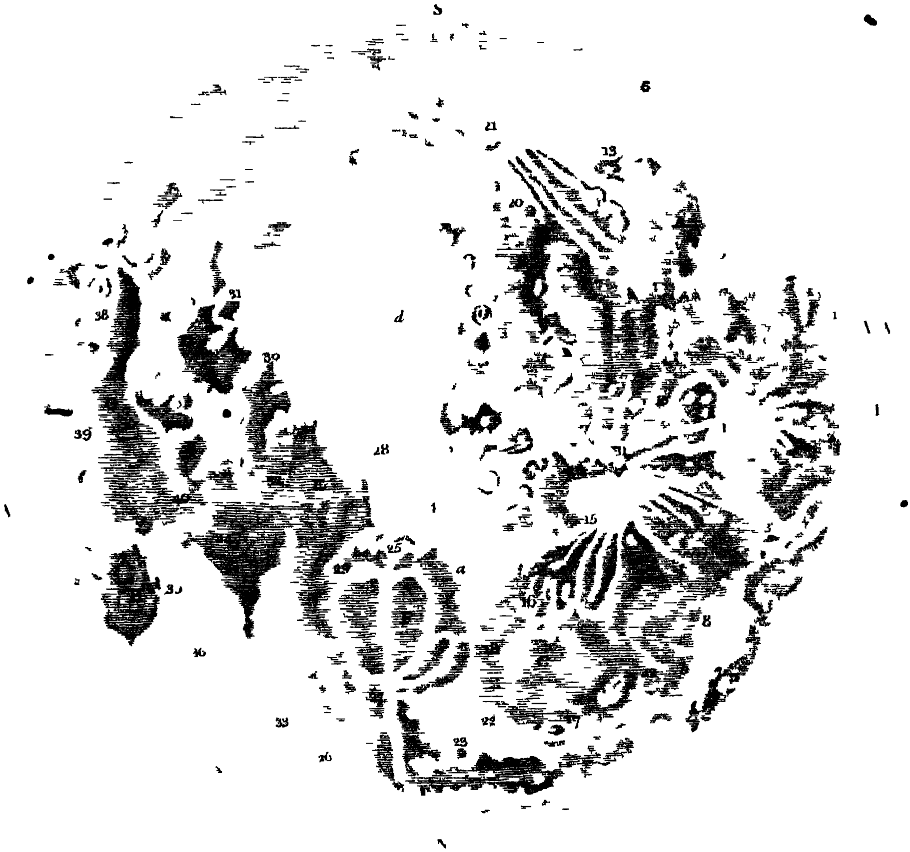
ASTRONOMY

The Solar System





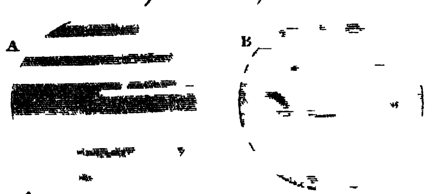
The Moon



Mars as observed by Herschel

A B C D

Jupiter by Dr



Saturn by